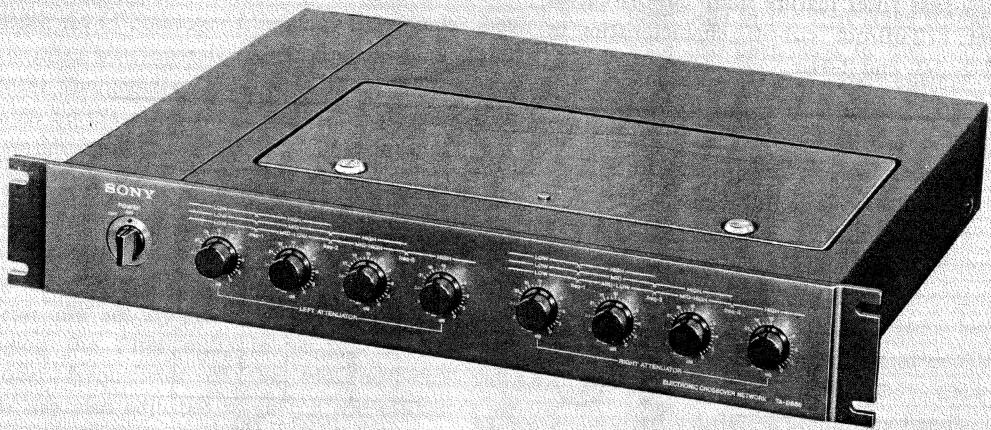


TA-D88B

Canadian Model
AEP Model



ELECTRONIC CROSSOVER NETWORK

General

Power Requirements: 120 V ac~, 60 Hz (Canadian Model)
110 V, 120 V, 220 V, or
240 V ac~, 50/60 Hz (AEP model)

Power Consumption: 20 watts

Dimensions: Approx.
480 (w) x 80 (h) x 365 (d) mm
18 1 5/16 (w) x 3 1/8 (h) x 14 3/8 (d) inches
Including projection parts and controls.

Weight: Approx. 7.4kg, 16 lb 5 oz, net
Approx. 9.5kg, 20 lb 15 oz, in shipping
carton

System: Filter characteristics: 24 dB-per-octave
Bessel function high-pass and low-pass
Buffer amp: DC amp

Crossover Frequency: UNIT 1: 140 Hz, 225 Hz, 280 Hz
UNIT 2: 500 Hz, 800 Hz, 1 kHz
UNIT 3: 1.25 kHz, 2 kHz, 2.5 kHz
UNIT 4: 5 kHz, 8 kHz, 10 kHz

ATTENTION AU COMPOSANT AYANT RAPPORT
À LA SÉCURITÉ !

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET
UNE MARQUE SUR LES DIAGRAMMES SCHÉ-
MATIQUES, LES VUES EXPLOSÉES ET LA LISTE
DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ
DE FONCTIONNEMENT. NE REMPLACER CES
COMPOSANTS QUE PAR DES PIÈCES SONY DONT
LES NUMÉROS SONT DONNÉS DANS CE MANUEL
OU DES SUPPLÉMENTS PUBLIÉS PAR SONY.

SPECIFICATIONS

Bandpass Gain: 0 dB

Inputs: 1 volt rated/7 volts maximum, 50 k ohms

Outputs: 1 volt rated/7 volts maximum, 100 ohms

Harmonic Distortion: Less than 0.003 % at 1 volt output
Less than 0.005 % at 5 volts output

Signal-to-Noise Ratio: Better than 110 dB (1 volt rated input, short-
circuited input, weighting network A)

Frequency Response: DC-100 kHz $\frac{+0}{-1}$ dB

SAFETY-RELATED COMPONENT WARNING !!

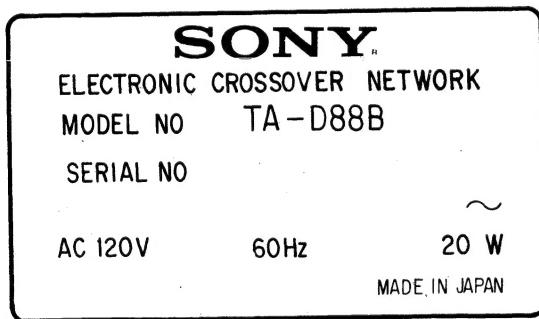
COMPONENTS IDENTIFIED BY SHADING AND MARK ON THE SCHEMATIC DIAGRAMS, EXPLODED
VIEWS AND IN THE PARTS LIST ARE CRITICAL TO
SAFE OPERATION. REPLACE THESE COMPONENTS
WITH SONY PARTS WHOSE PART NUMBERS APPEAR
AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS
PUBLISHED BY SONY.

SONY
SERVICE MANUAL

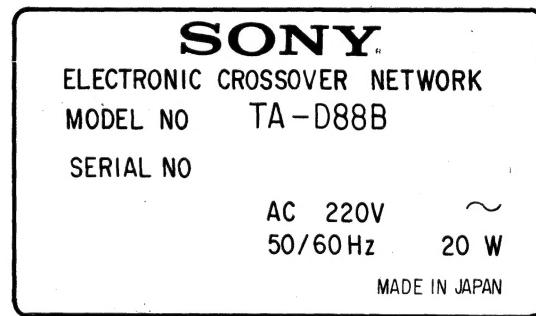
● MODEL IDENTIFICATION

— Specification Label —

Canadian model



AEP model



SECTION 1

1-1. CIRCUIT DESCRIPTION

The TA-D88B is an electronic crossover network designed for use in multi-amplifier stereo systems. The input audio signal is divided into a number of different frequency bands, each band being amplified independently and passed on to individual speakers. See fig. 3 for an outline of the circuit diagram.

Each set of crossover frequency filters have been incorporated into separate plug-in type units. Suitable crossover frequencies for a wide range of speakers available on the market may be set by plugging in an appropriate combination of the 4 different units.

The crossover frequency of each unit is determined by the capacitance of the filters, and the frequency selector switches S1-S4. For 2-way to 4-way multi-amplifier systems, the crossover frequencies are set by adjusting S1-S4, and by rearranging the filter units in accordance with the crossover frequencies of the speakers employed. Levels are also adjusted to match the efficiency of each speaker.

Note that the following description refers to a 4-way multi-amplifier system.

1. Pre-buffer Amplifier Stage (see Fig. 1)

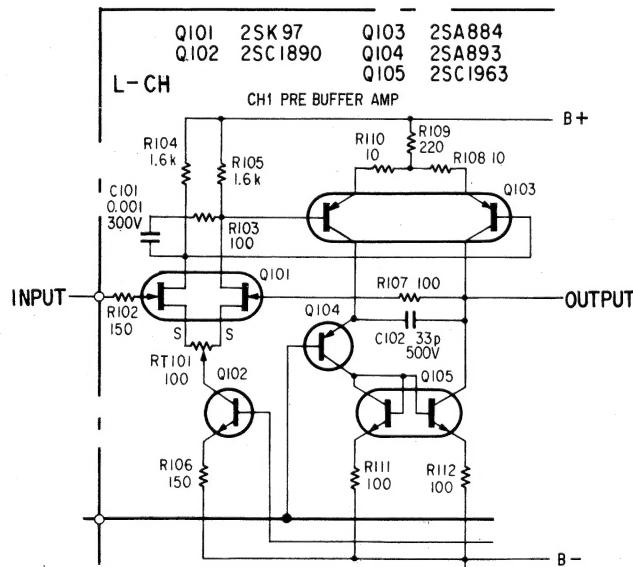


Fig. 1

The purpose of the pre-buffer amplifier (Q101-Q105) is to eliminate the influence of the preamplifier and connecting cord upon the filters. With 100% negative feedback applied to the first-stage differential amplifier (Q101) by resistor R107 (100 Ω), the pre-buffer amplifier has high input impedance and low

OUTLINE

output impedance. In addition, a current-mirror loaded 2-stage differential amplifier structure reduces distortion to a very low level. Furthermore, in order to make the low channel amplifier a pure DC amplifier employing no coupling capacitors, a dual FET differential amplifier which suppresses DC drift has been used in the first stage (Q101). Dual transistors have also been used in the second stage differential amplifier (Q103) and current mirror (Q105) to further suppress DC drift. By connecting the base of Q104 to ground, the collector voltage of the PNP transistor on the left hand side of Q103 is reduced to almost 0 V, thereby equalizing the collector voltage of both PNP transistors in Q103. The dual transistor P_c (power input dc to collector) are therefore very much the same, resulting in the amount of drift in both sides being balanced. The impedance-converted signal is then passed from the pre-buffer amplifier to CH1-CH4 where it is divided into 4 different frequency bands.

2. LOW Channel Stage (CH-1)

The low-pass filters employed in this stage achieve a very sharp cut-off slope of 24 dB/oct (12 dB/oct at filter 1-1 and again at filter 1-2). (See Fig. 3-1).

Each low-pass filter buffer amplifier has a high input impedance and low output impedance current-mirror loaded 2-stage differential amplifier, similar to the pre-buffer amplifier (Q101-Q105). The crossover frequency is selected by the freq-1 switch (S1), thereby defining the f_1 frequency band.

The filter output signal is then passed via the level adjustment control (RV601) on to the output buffer amplifier (Q106-Q110) where the impedance is again converted, and finally appearing on the J102 output terminal. The role of this output buffer amplifier is not to change the crossover-frequency and the input impedance of the power amplifier.

3. MID-LOW Channel Stage (CH-2)

The signal whose impedance was converted in the pre-buffer amplifier is narrowed down to a frequency band between f_1 and f_2 according to the freq-1 and freq-2 settings (see Fig. 3-2). Both the high-pass filter and low-pass filter feature sharp cut-off curves of 24 dB/oct (12 dB/oct cut-off characteristics in filters 2-1, 2-2, 2-3, and 2-4).

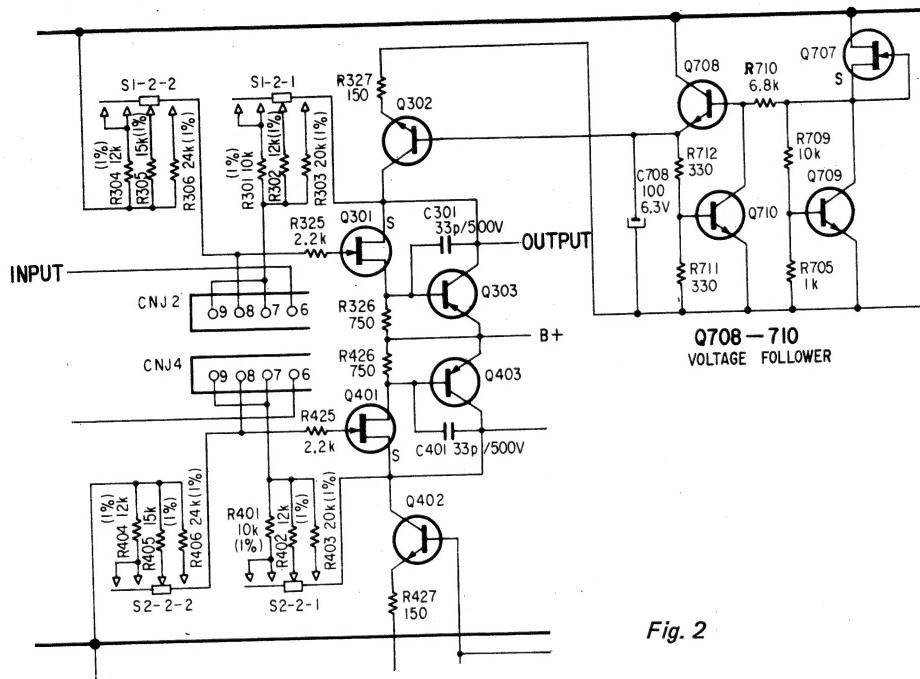


Fig. 2

The basic circuitry employed in the buffer amplifiers in each of the filters in the MID-LOW channel stage is outlined in Fig. 2. Each of these buffer amplifiers are bybrid type source-follower amplifiers employing PNP transistors and FETs designed for high frequency circuits. By connecting the collector of Q303 to the source of the high frequency FET, a 100% negative feedback is applied for high input impedance and low output impedance. The load for this amplifier is Q302. And since it is a constant current load, there is very little distortion, and no interference from the filter unit power supplies. The bias applied to the base of Q302 is stabilized by Q707-Q710.

Since there is no need to operate the MID-LOW channel stage anywhere near the DC region, coupling capacitors have been employed prior to the RV602 control and the output terminals, thereby suppressing DC offset. The capacitor employed in front of RV602 consists of a tantalum capacitor (C305) connected in parallel with a film capacitor (C306), and has been inserted in order to prevent deterioration of sound quality.

The MID-LOW channel stage employs an output buffer amplifier (Q111-Q113) in the output stage for the same reason as the LOW channel stage.

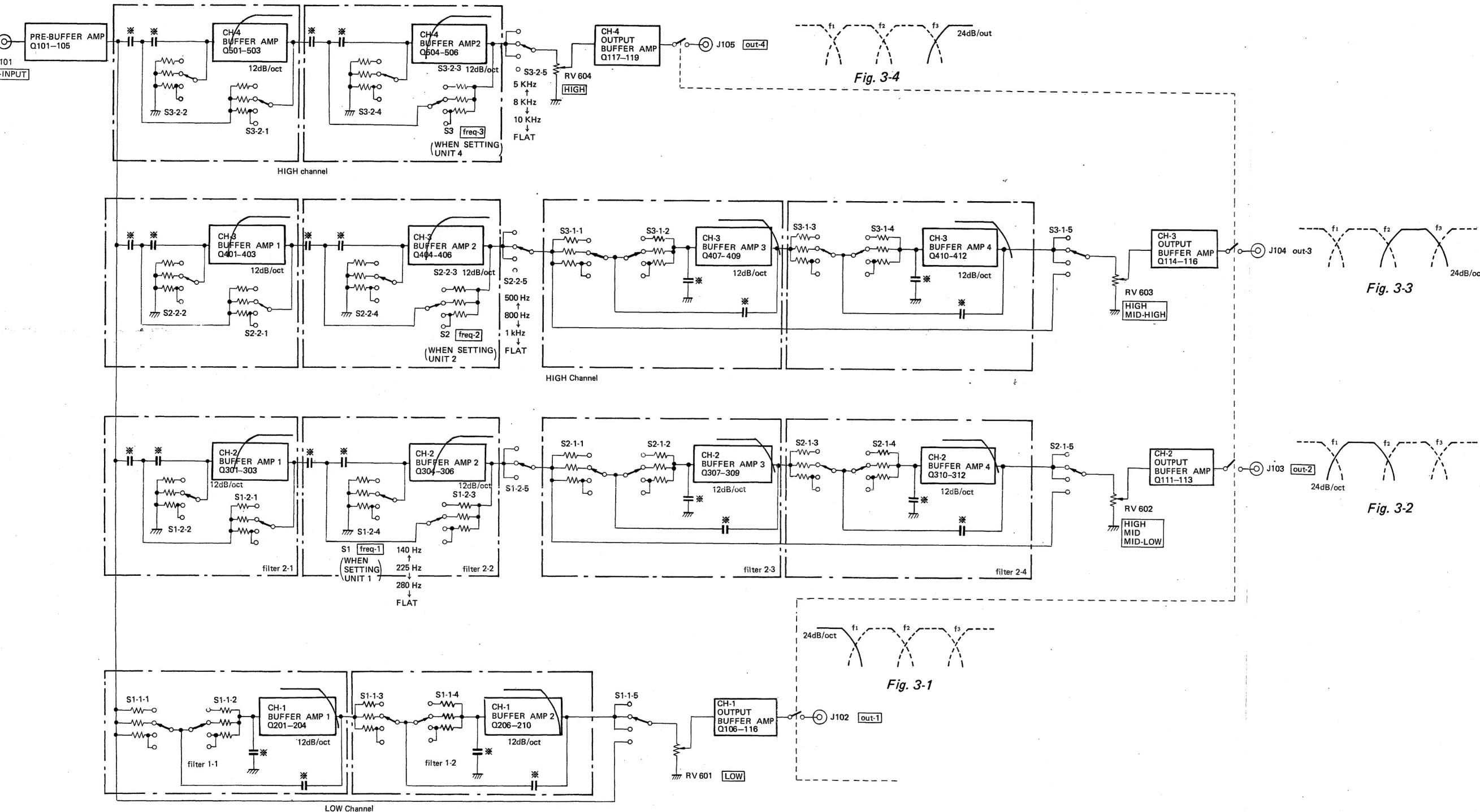
4. MID-HIGH Channel Stage (CH-3)

The MID-HIGH channel stage employs the same basic circuit structure as the MID-LOW channel stage. The frequency band between the f_2 and f_3 crossover frequencies is set by the freq-2 and freq-3 switch positions (see Fig. 3-3).

5. HIGH Channel Stage (CH-4)

The circuitry of this stage is basically the same as the high-pass filter and output buffer amplifier employed in the MID-HIGH channel stage. The frequency band is determined by the f_3 crossover frequency set by the freq-3 switch position (see Fig. 3-4).

TA-D88B TA-D88B



The capacitance values marked * are decided by setting the units 1 to 4.

Fig. 3

6. Muting Circuit (Fig. 4)

By activating a relay circuit, the muting circuit disconnects the signal line, and thereby prevents the appearance of any signals at the output terminals when the power switch is turned on and off. The "pop" noises generated at this time are therefore completely silenced. Note that this muting circuit is designed to close the signal line when the muting relays (RY1-RY8) are "on".

In addition, whenever the frequency response select cover is opened to exchange filter units, S7 is switched off, and again preventing the appearance of any signals at the output terminals.

1) When the power switch is turned on

(a) As soon as the power switch is turned on, both B+ and B- will commence to "charge up". C810 will also commence to charge up, requiring 2 to 3 seconds (as determined by the R803/C810 time constant) to be fully charged. During this period Q801 and Q802 will remain off, thereby keeping the muting relays (RV1-RV8) off as well. Therefore, no signals will appear at the output

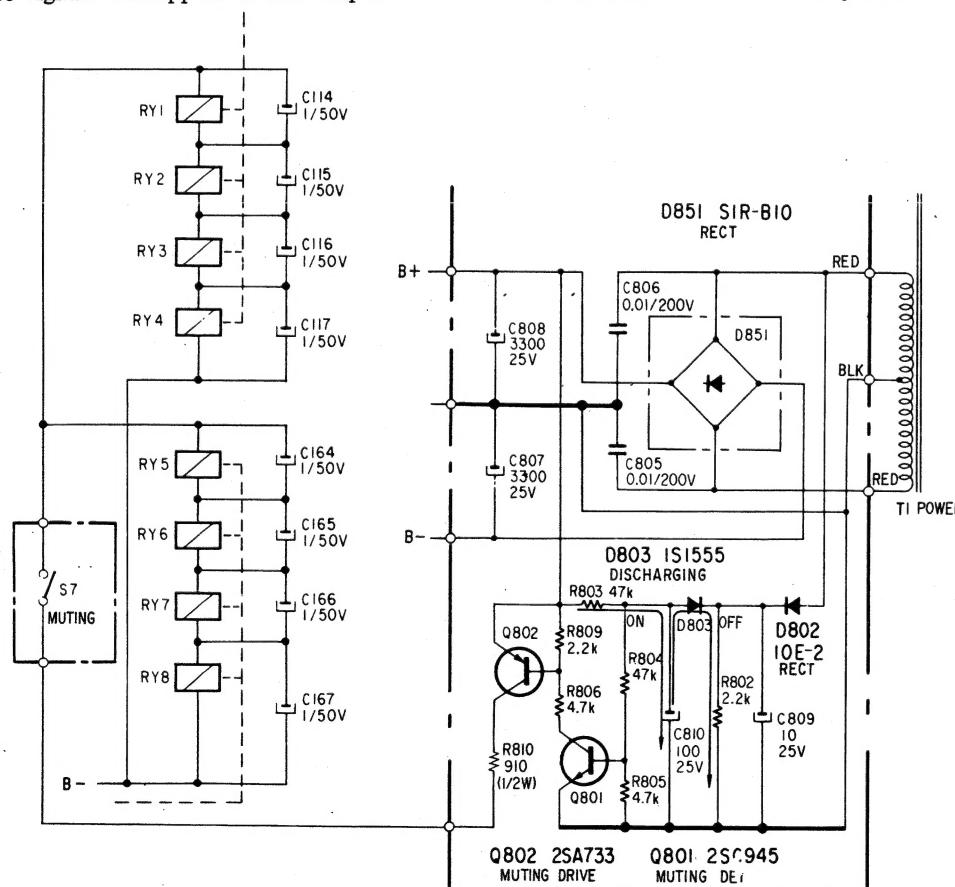


Fig. 4

terminals, effectively muting out the power switching noise.

- (b) 2 to 3 seconds after turning the power switch on, the potential on the base of Q801 reaches "on" potential, resulting in this transistor turning on.
- (c) As soon as Q801 is turned on, Q802 is also turned on, resulting in muting relays (RY1–RY8) being turned on, and the output signals appear at the output terminals.

2) When the power switch is turned off

- (a) At the same time that the power switch is turned off, the positive potential which had been applied to the cathode of D803 via D802 decreases, resulting in the D803 diode being turned on by the forward biasing.
- (b) The charge on C810 is consequently discharged via D803 and R802, resulting in Q801 and Q802 both being turned off. The muting relays are also turned off, preventing any output signals from appearing at the output terminals. The "pop" noise generated when the power switch is turned off is also effectively muted.

3) When the frequency response select cover is opened (Fig. 5).

When the frequency response select cover opened, S7 is turned off, thereby cutting off the voltage being applied to the muting relays (RY1-RY8). These relays are therefore turned off, and no signals will appear at the output terminals. So none of the noise generated when exchanging units will reach the speakers.

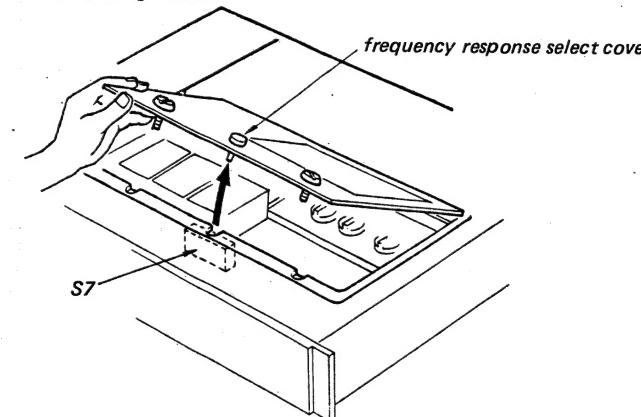
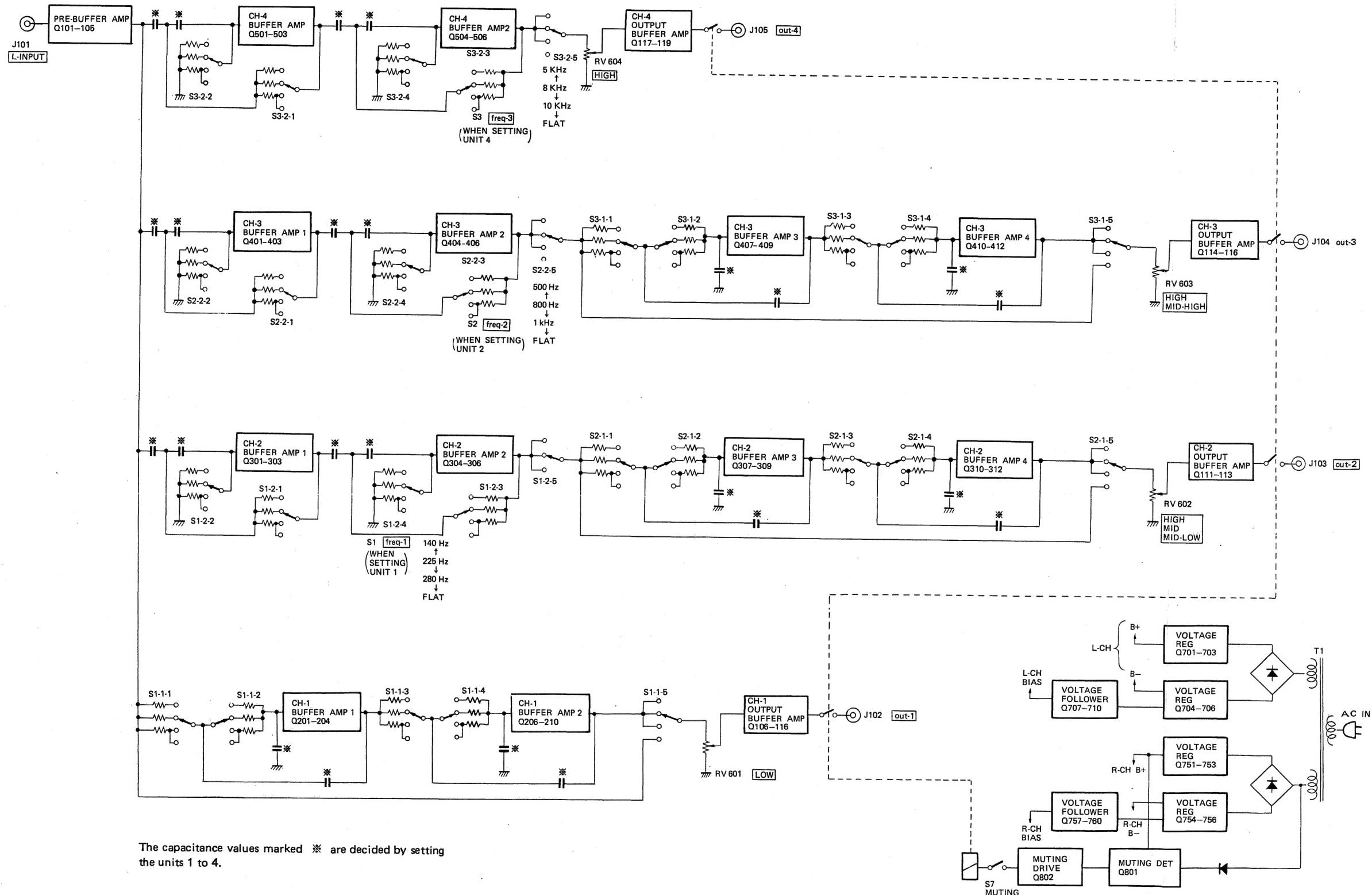


Fig. 3

1-2. BLOCK DIAGRAM



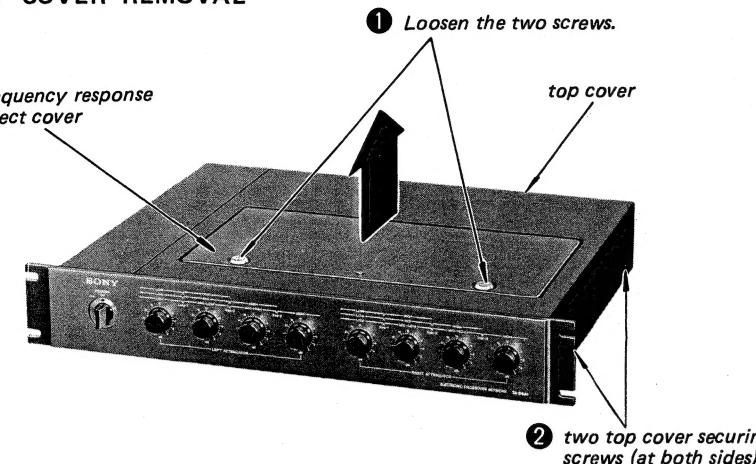
SECTION 2

DISASSEMBLY

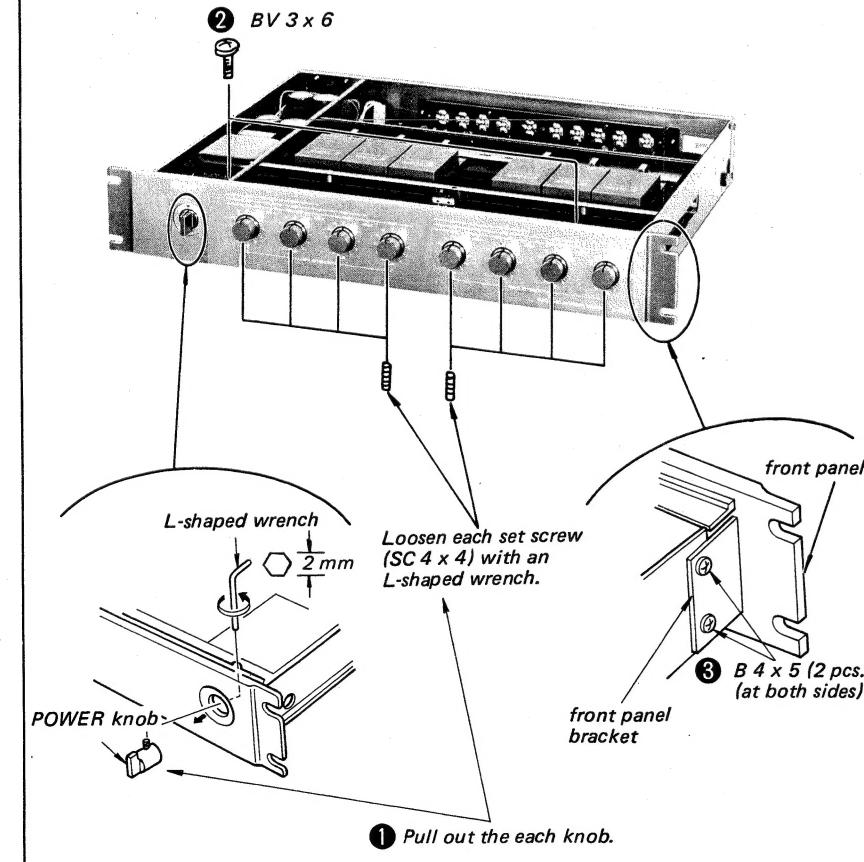
2-1. REMOVAL

Note: Follow the disassembly procedure in the numerical order given.

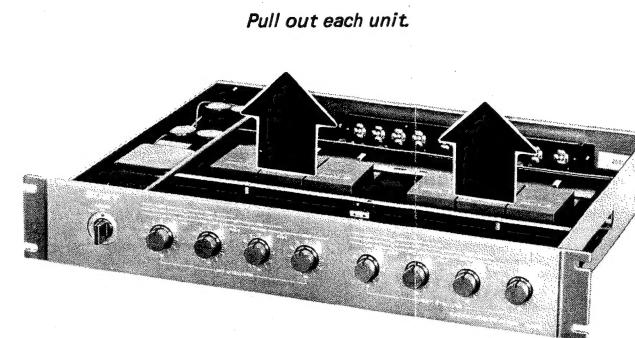
TOP COVER REMOVAL



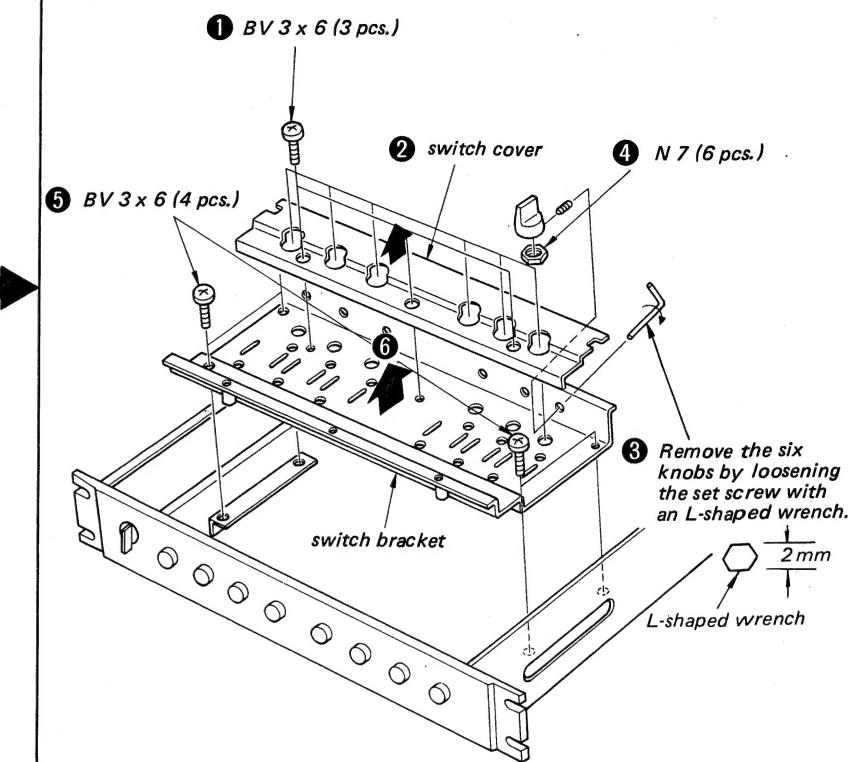
FRONT PANEL REMOVAL



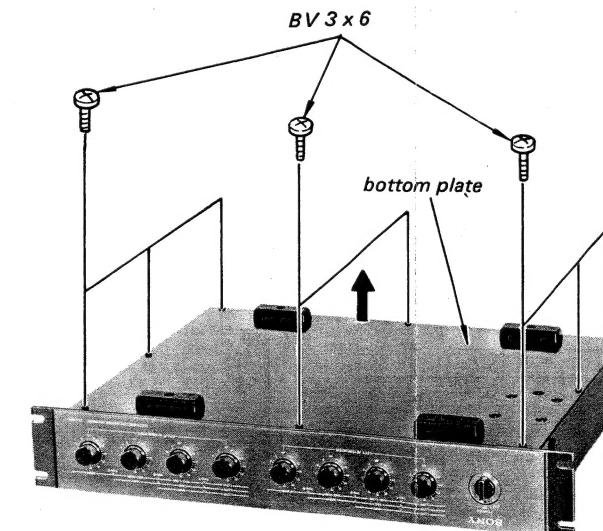
UNIT REMOVAL



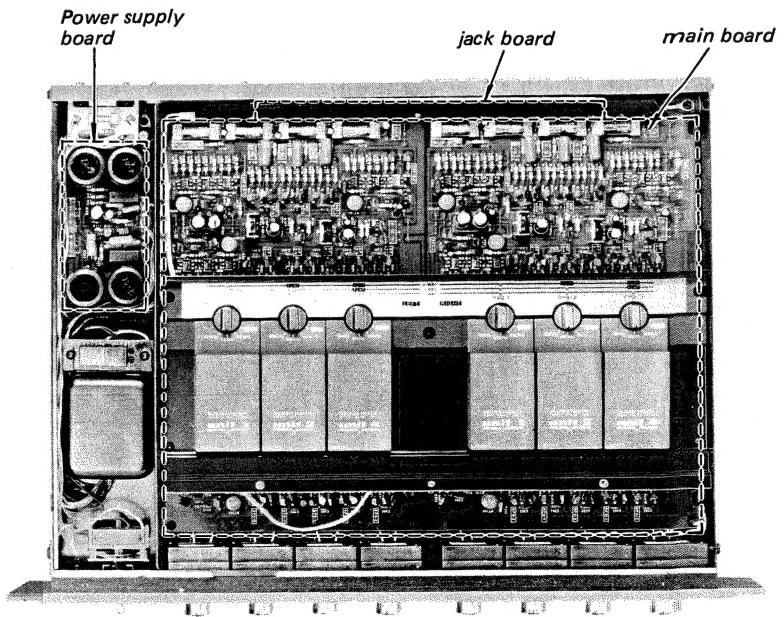
SWITCH COVER AND SWITCH BRACKET REMOVAL



BOTTOM PLATE REMOVAL



Each circuit board can be checked.



SECTION 3

ADJUSTMENTS

OFFSET ADJUSTMENT

- **Settings**

POWER switch: ON

LEFT, RIGHT ATTENUATOR: 0 dB (MAX)

- **Procedure**

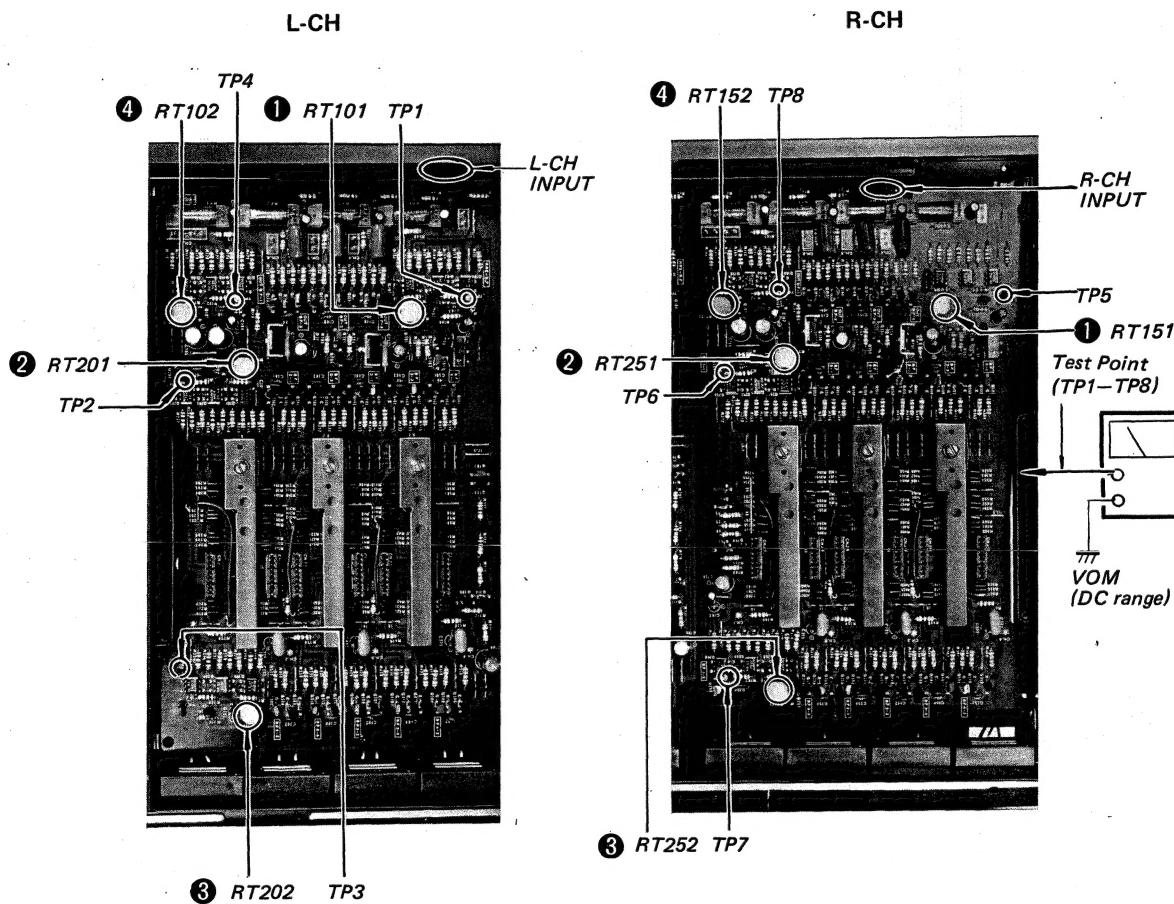
1. Short-circuit both INPUT jacks.
2. Adjust each adjustable resistor in the numerical order (① – ④) so that the VOM reads 0 V at each test point (TP1–8).

L-CH

R-CH

① RT101 (TP1)	① RT151 (TP5)
② RT201 (TP2)	② RT251 (TP6)
③ RT202 (TP3)	③ RT252 (TP7)
④ RT102 (TP4)	④ RT152 (TP8)

Specification: 0 V ± 0.1 mV



MUTING TIME CHECK

Check the operation of each relay (RY1–RY8).

1. POWER Switch ON

Two or three seconds after turning the power switch on, RY1–RY8 are energized.

2. POWER Switch OFF

RY1–RY8 are released at the moment POWER switch is turned off.

MEMO

SECTION 4 DIAGRAMS

4-1. MOUNTING DIAGRAM

— Conductor Side —

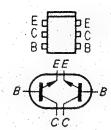
• Replacement Semiconductors

For replacement, use semiconductors except in ().

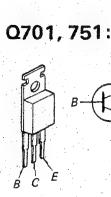
Q101, 151 : 2SK97
Q106, 156 : 2SK97
Q201, 251 : 2SK97
Q206, 256 : 2SK97



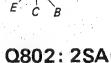
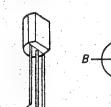
Q105, 155 : 2SC1963
Q110, 160 : 2SC1963
Q205, 255 : 2SC1963
Q210, 260 : 2SC1963



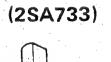
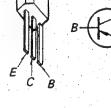
Q102, 152 : 2SC926A
Q107, 157 : 2SC926A
Q112, 162 : 2SC926A
Q115, 165 : 2SC926A
Q118, 168 : 2SC926A
Q202, 252 : 2SC926A
Q207, 257 : 2SC926A
Q302, 352 : 2SC926A
Q305, 355 : 2SC926A
Q308, 358 : 2SC926A
Q311, 361 : 2SC926A
Q402, 252 : 2SC926A
Q405, 455 : 2SC926A
Q408, 458 : 2SC926A
Q411, 461 : 2SC926A
Q502, 552 : 2SC926A
Q505, 555 : 2SC926A
Q703, 753 : 2SC926A
Q708, 758 : 2SC926A
Q709, 759 : 2SC926A
Q710, 760 : 2SC926A



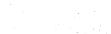
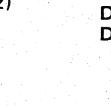
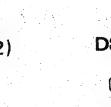
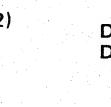
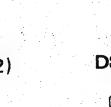
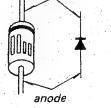
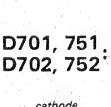
Q701, 751 : 2SC1173
Q706, 756 : 2SA473

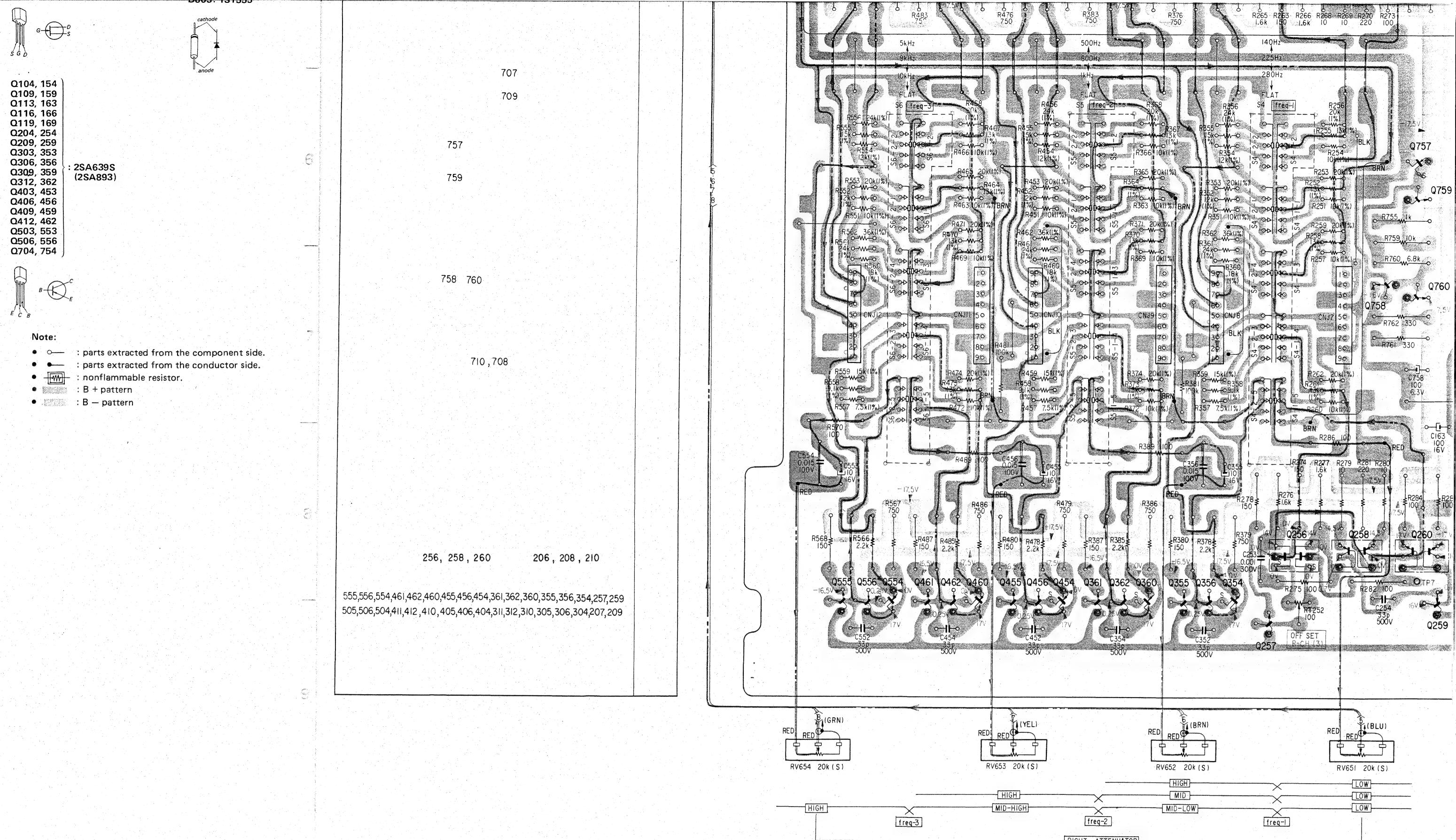


Q801 : 2SC1364 (2SC945)



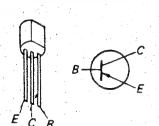
Q103, 153 : 2SA884
Q108, 158 : 2SA884
Q203, 253 : 2SA884
Q208, 258 : 2SA884



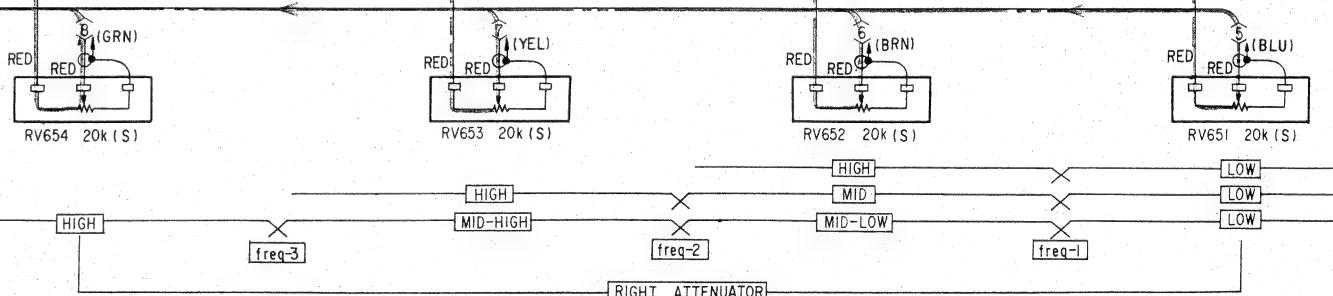
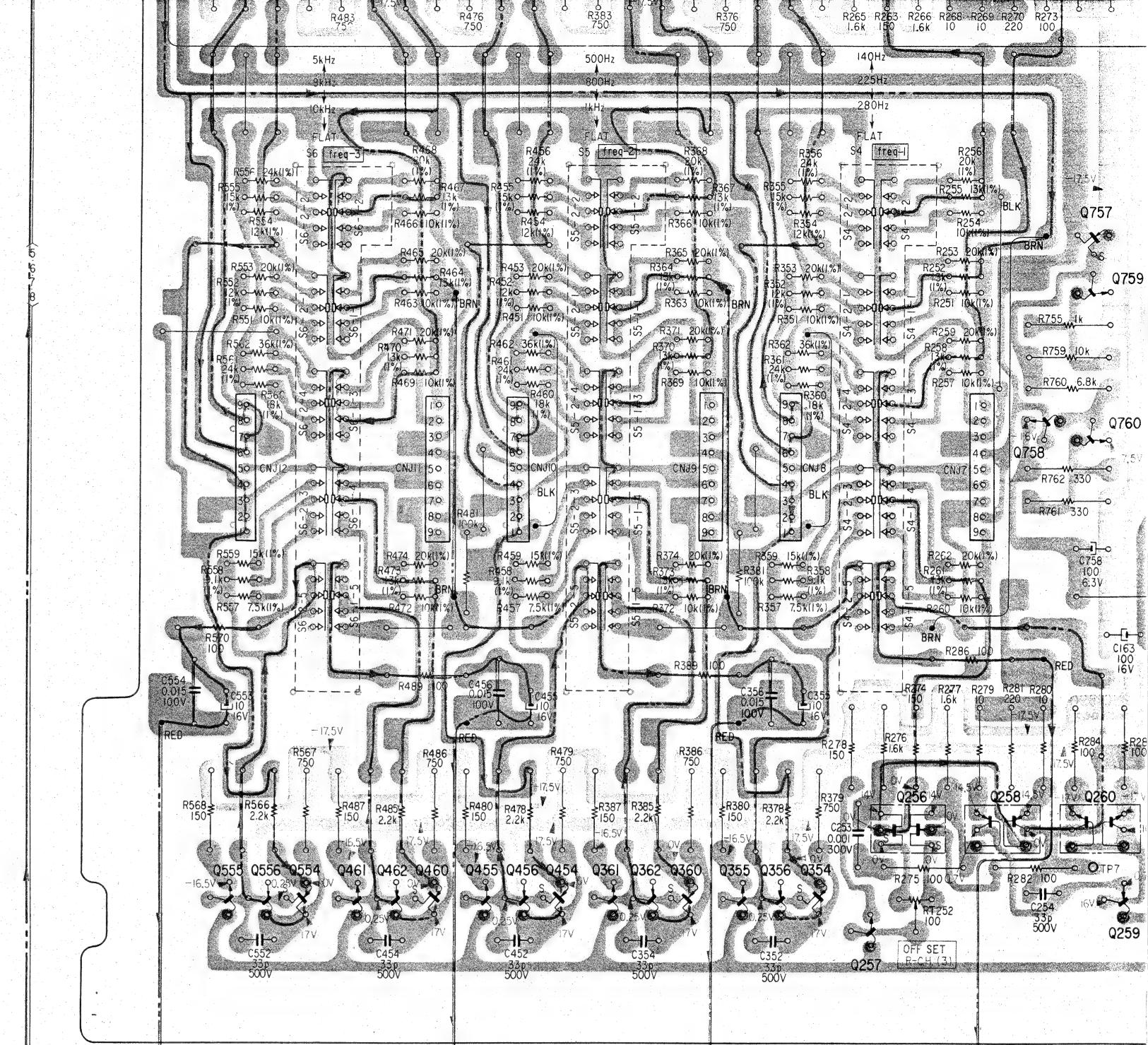
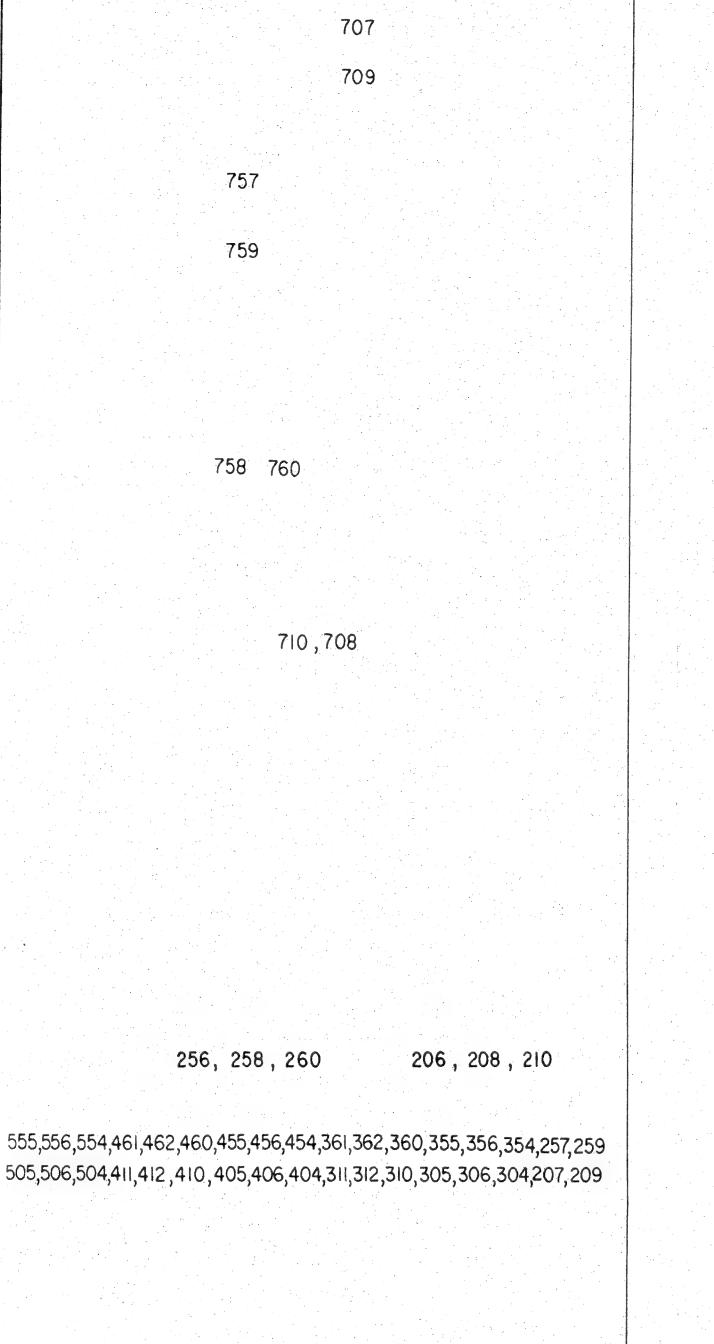


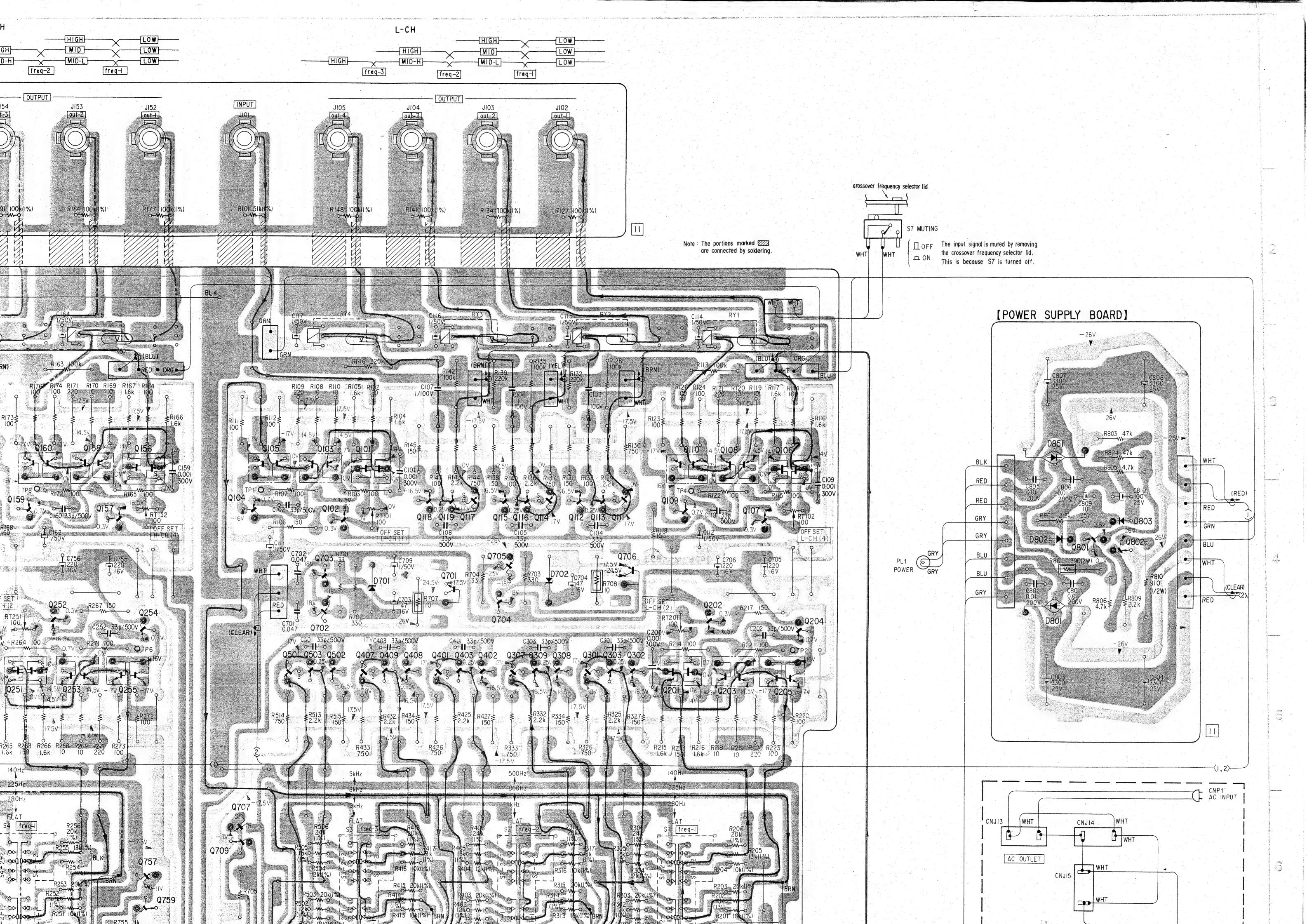


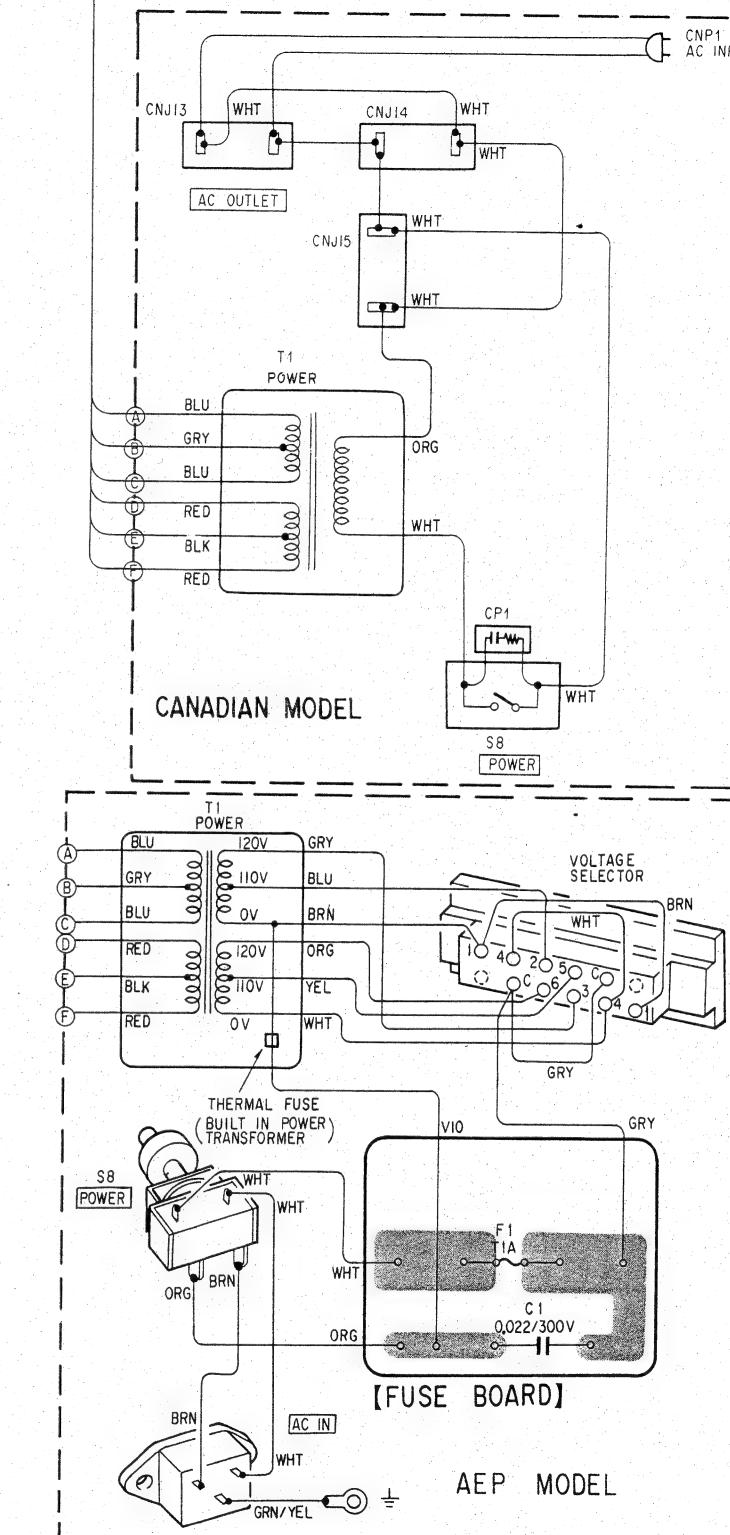
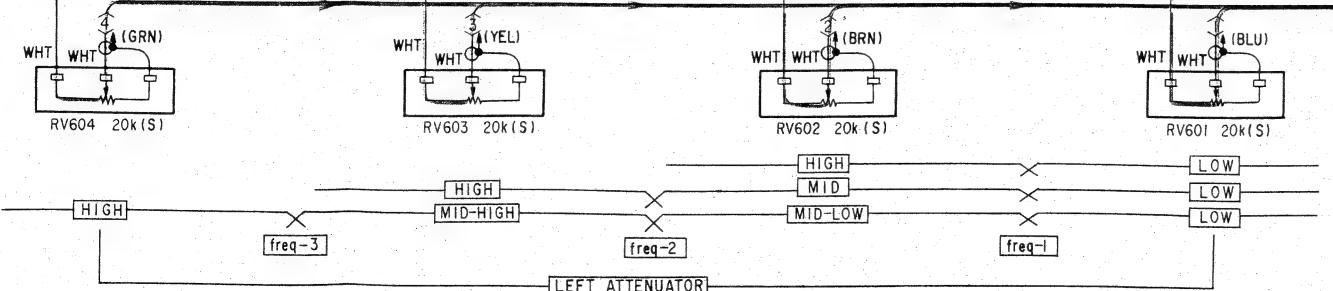
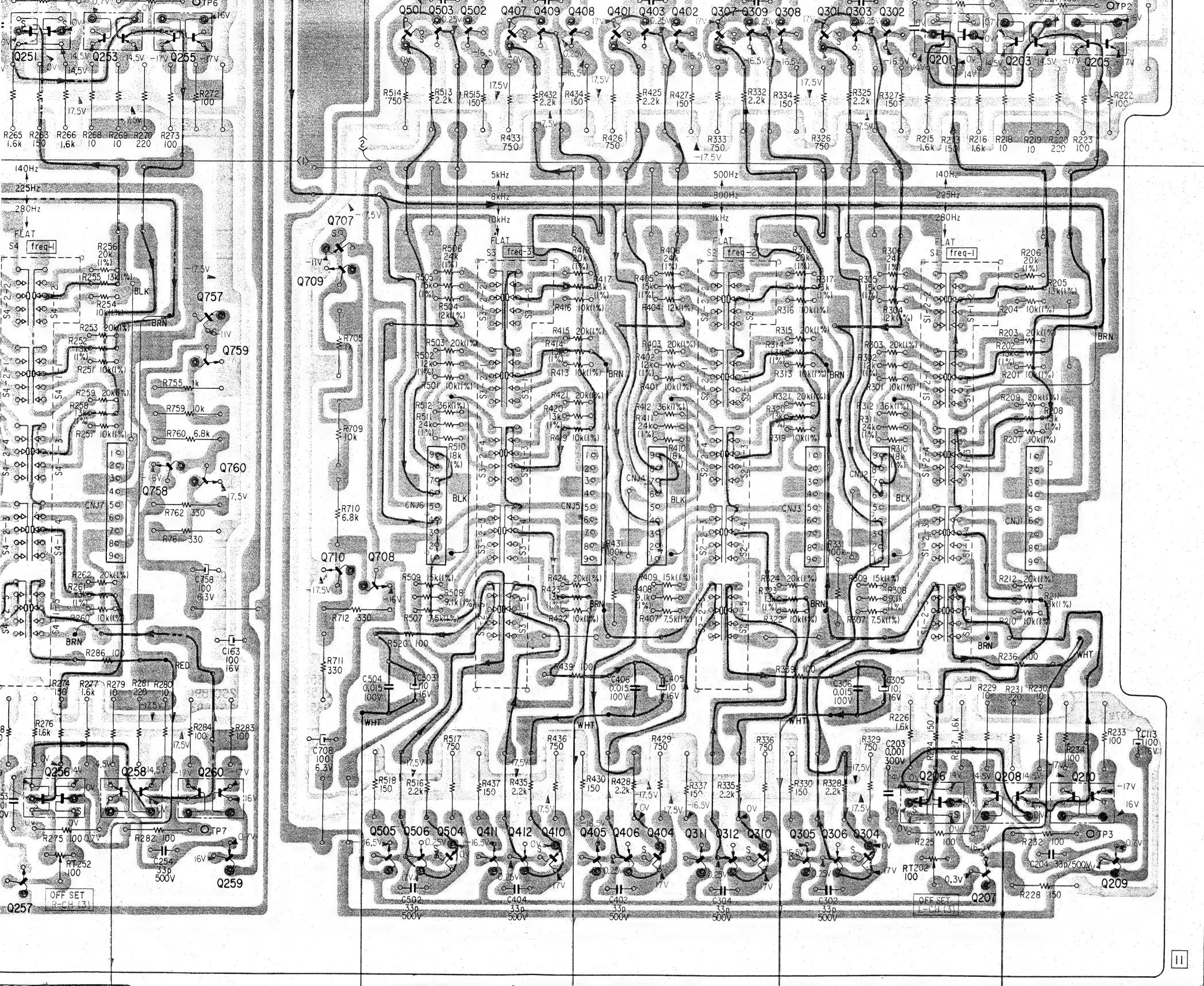
Q104, 154
 Q109, 159
 Q113, 163
 Q116, 166
 Q119, 169
 Q204, 254
 Q209, 259
 Q303, 353
 Q306, 356
 Q309, 359
 Q312, 362
 Q403, 453
 Q406, 456
 Q409, 459
 Q412, 462
 Q503, 553
 Q506, 556
 Q704, 754



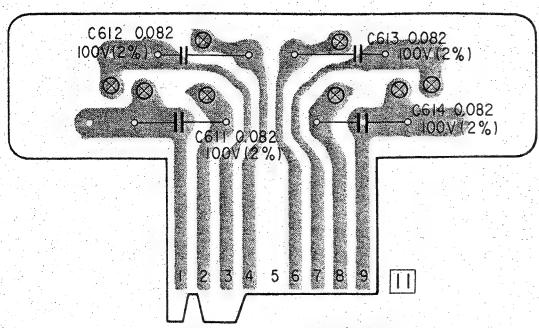
Note:
 • : parts extracted from the component side.
 • : parts extracted from the conductor side.
 • : nonflammable resistor.
 • : B+ pattern
 • : B- pattern



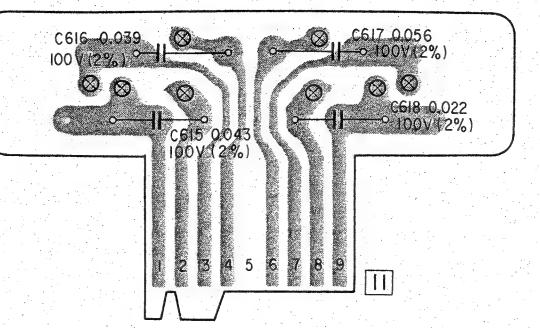




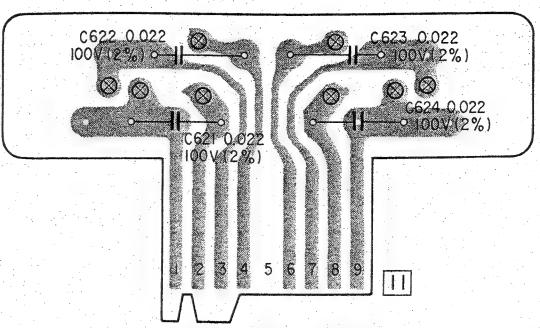
4-2. SCHEMATIC DIAGRAM



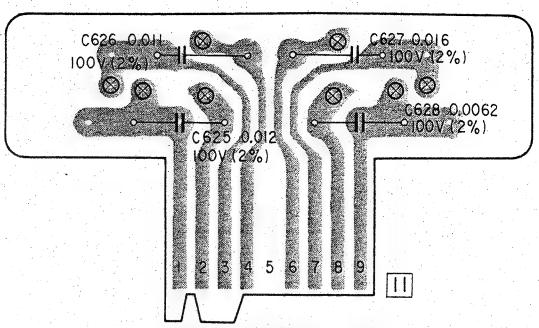
[UNIT (1A) BOARD]



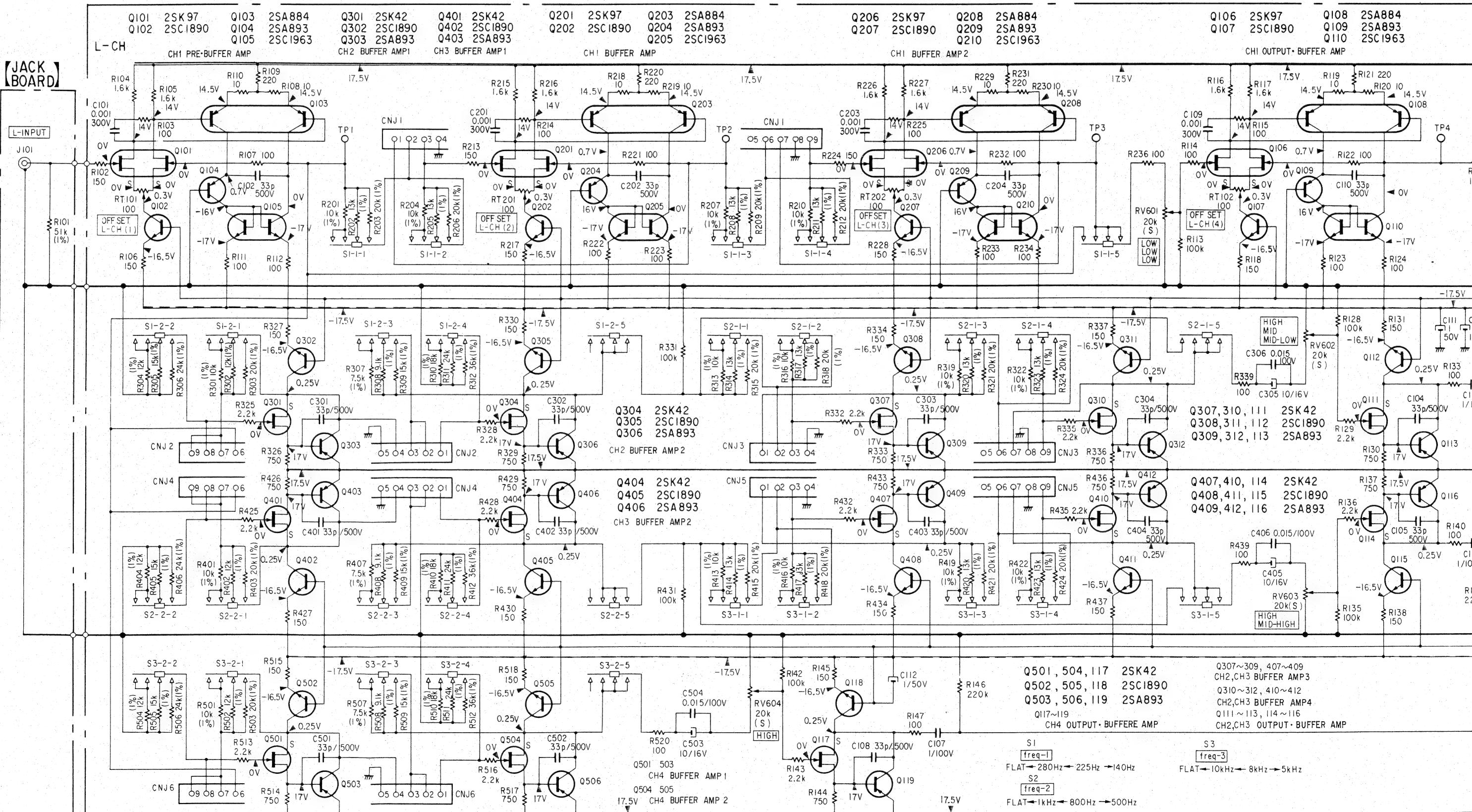
[UNIT (1B) BOARD]

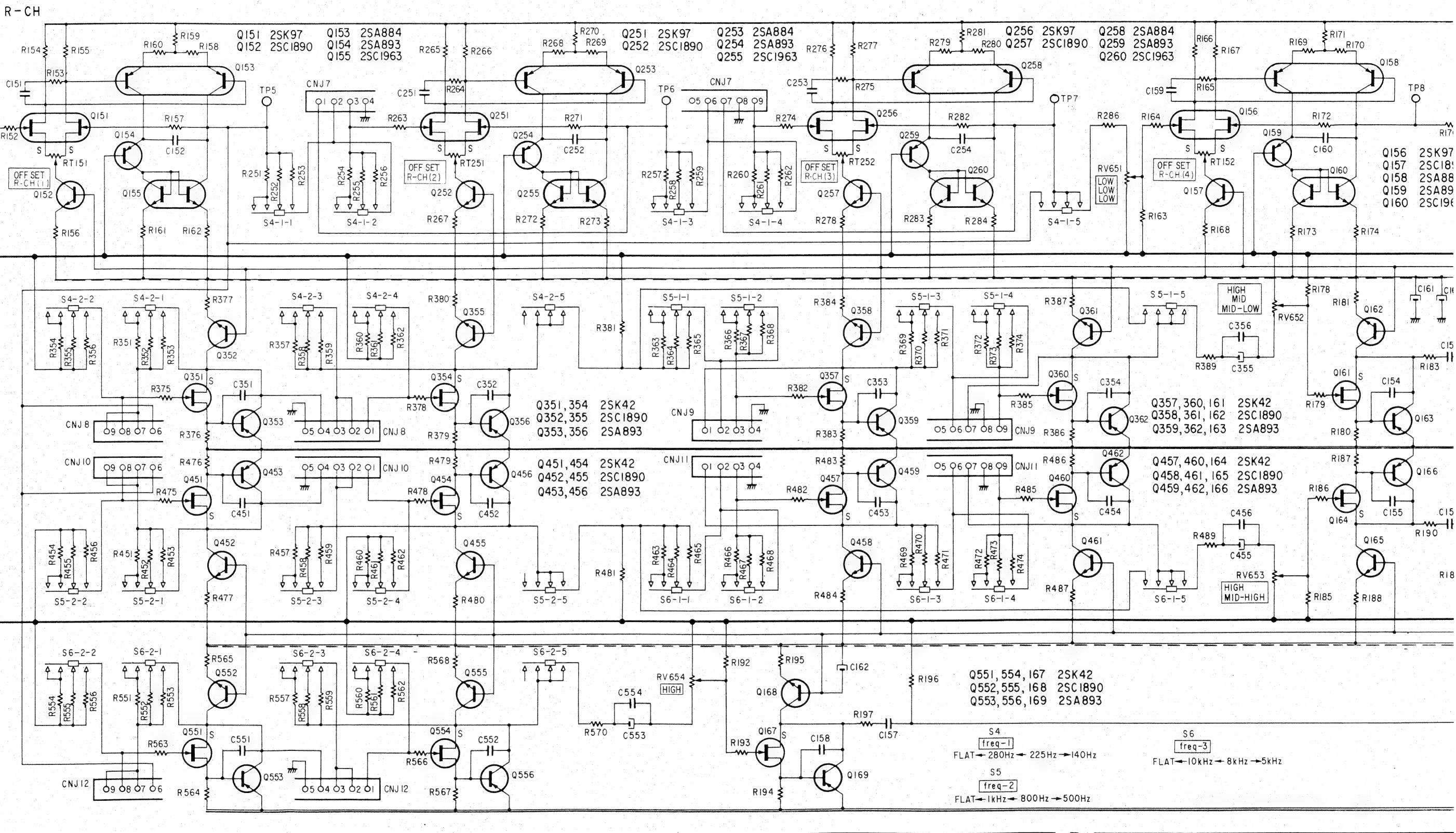
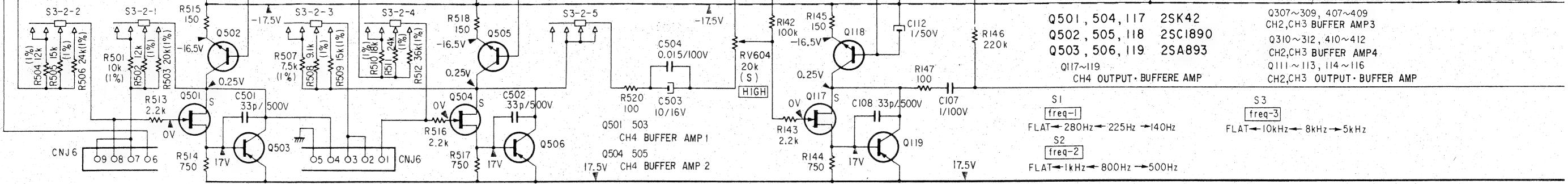


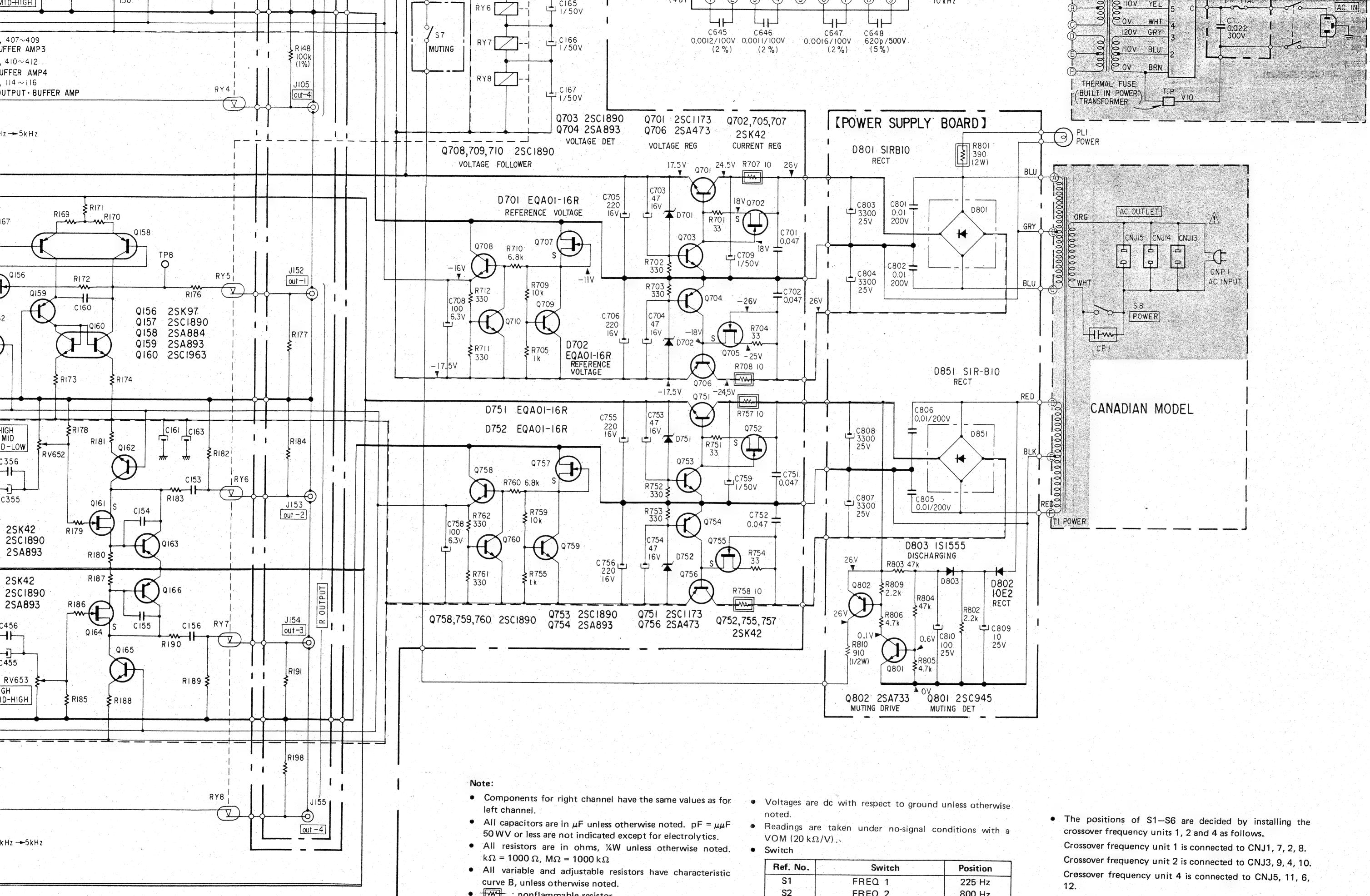
[UNIT (2A) BOARD]



[UNIT (2B) BOARD]







Note:

- Components for right channel have the same values as for left channel.
- All capacitors are in μF unless otherwise noted. μF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, $1/4\text{W}$ unless otherwise noted. $\text{k}\Omega = 1000\ \Omega$, $\text{M}\Omega = 1000\ \text{k}\Omega$
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : non-flammable resistor.
- (1%): resistor tolerance $\pm 1\%$
- (2%): capacitor tolerance $\pm 2\%$
- : B+ bus.
- : B- bus.
- : panel designation.
- : adjustment for repair.

- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20 k Ω /V).
- Switch

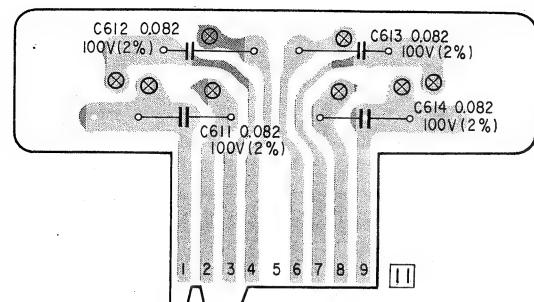
Ref. No.	Switch	Position
S1	FREQ 1	225 Hz
S2	FREQ 2	800 Hz
S3	FREQ 3	8 kHz
S4	FREQ 4	225 Hz
S5	FREQ 2	800 Hz
S6	FREQ 3	8 kHz
S7	MUTING	OFF
S8	POWER	OFF

- The positions of S1~S6 are decided by installing the crossover frequency units 1, 2 and 4 as follows.
Crossover frequency unit 1 is connected to CNJ1, 7, 2, 8.
Crossover frequency unit 2 is connected to CNJ3, 9, 4, 10.
Crossover frequency unit 4 is connected to CNJ5, 11, 6, 12.

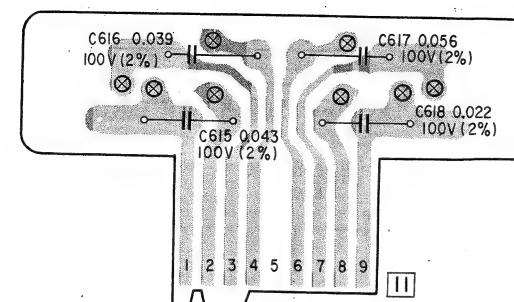
TA-D88B TA-D88B

4-3. UNIT BOARD DIAGRAM

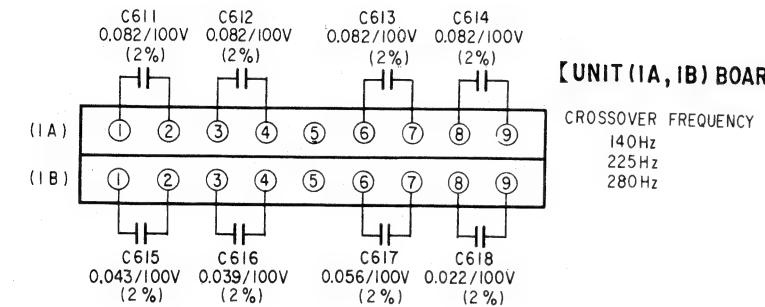
【UNIT (1A, 1B) BOARD】



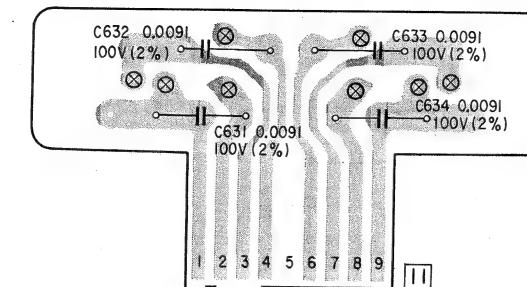
【UNIT (1A) BOARD】



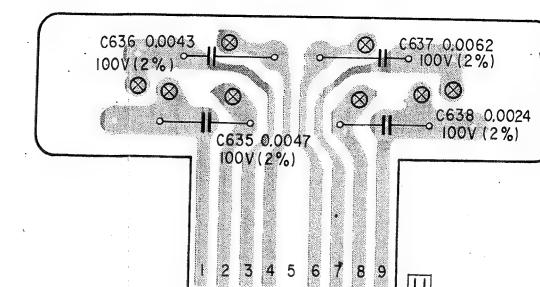
【UNIT (1B) BOARD】



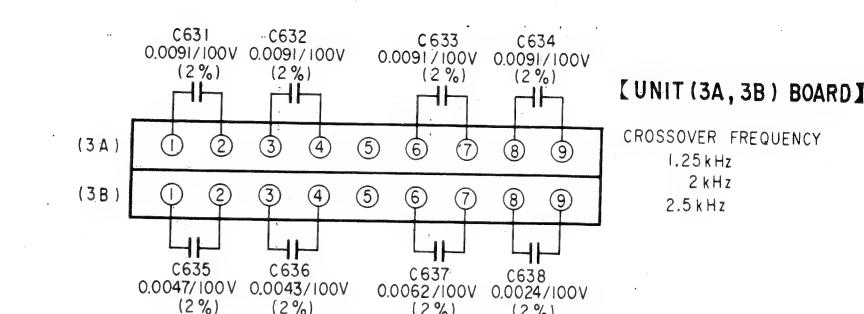
【UNIT (3A, 3B) BOARD】



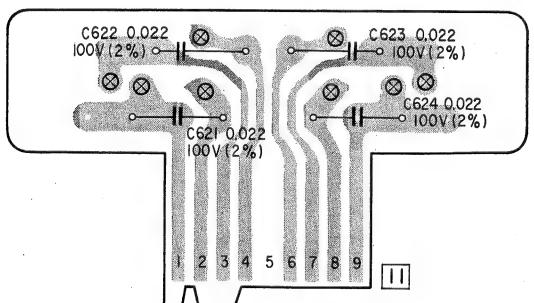
【UNIT (3A) BOARD】



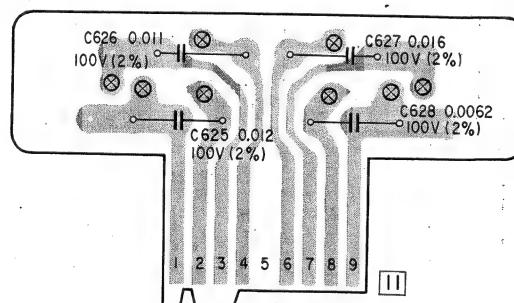
【UNIT (3B) BOARD】



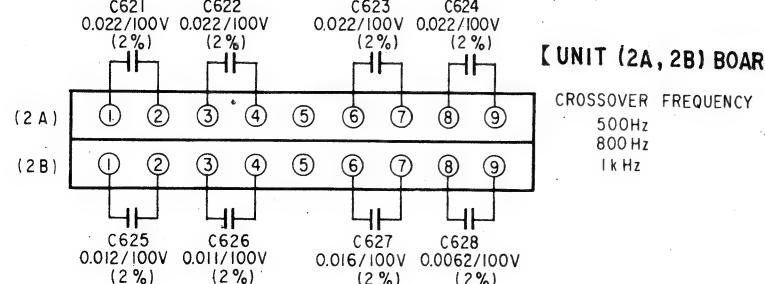
【UNIT (2A, 2B) BOARD】



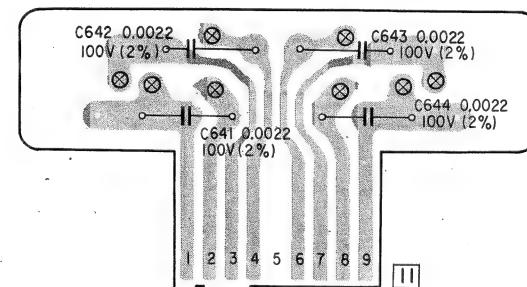
【UNIT (2A) BOARD】



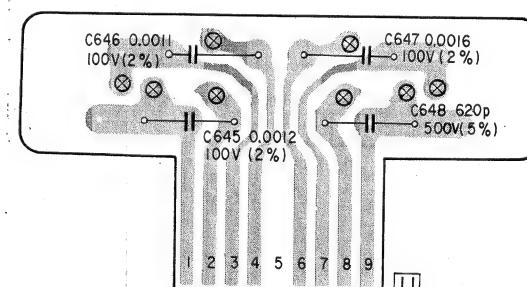
【UNIT (2B) BOARD】



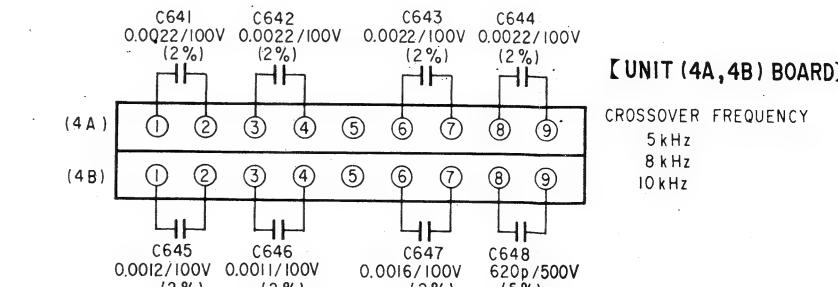
【UNIT (4A, 4B) BOARD】



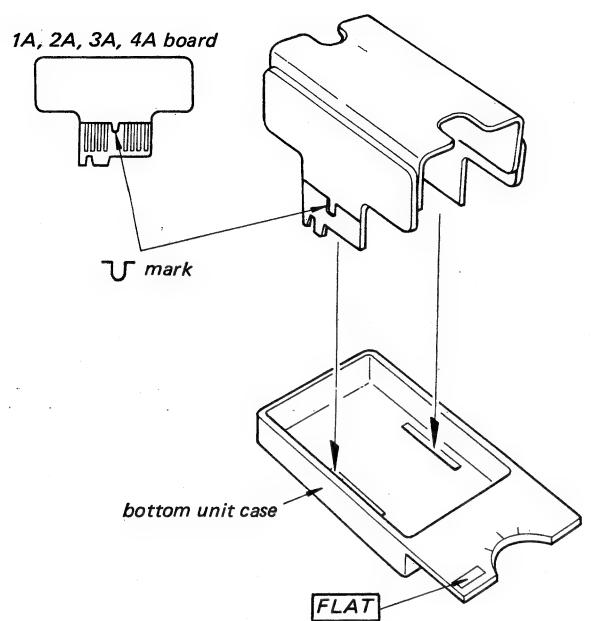
【UNIT (4A) BOARD】



【UNIT (4B) BOARD】



Note: Install the A board in the bottom unit case, face in the direction indicated.



SECTION 5

EXPLODED VIEWS

A

B

C

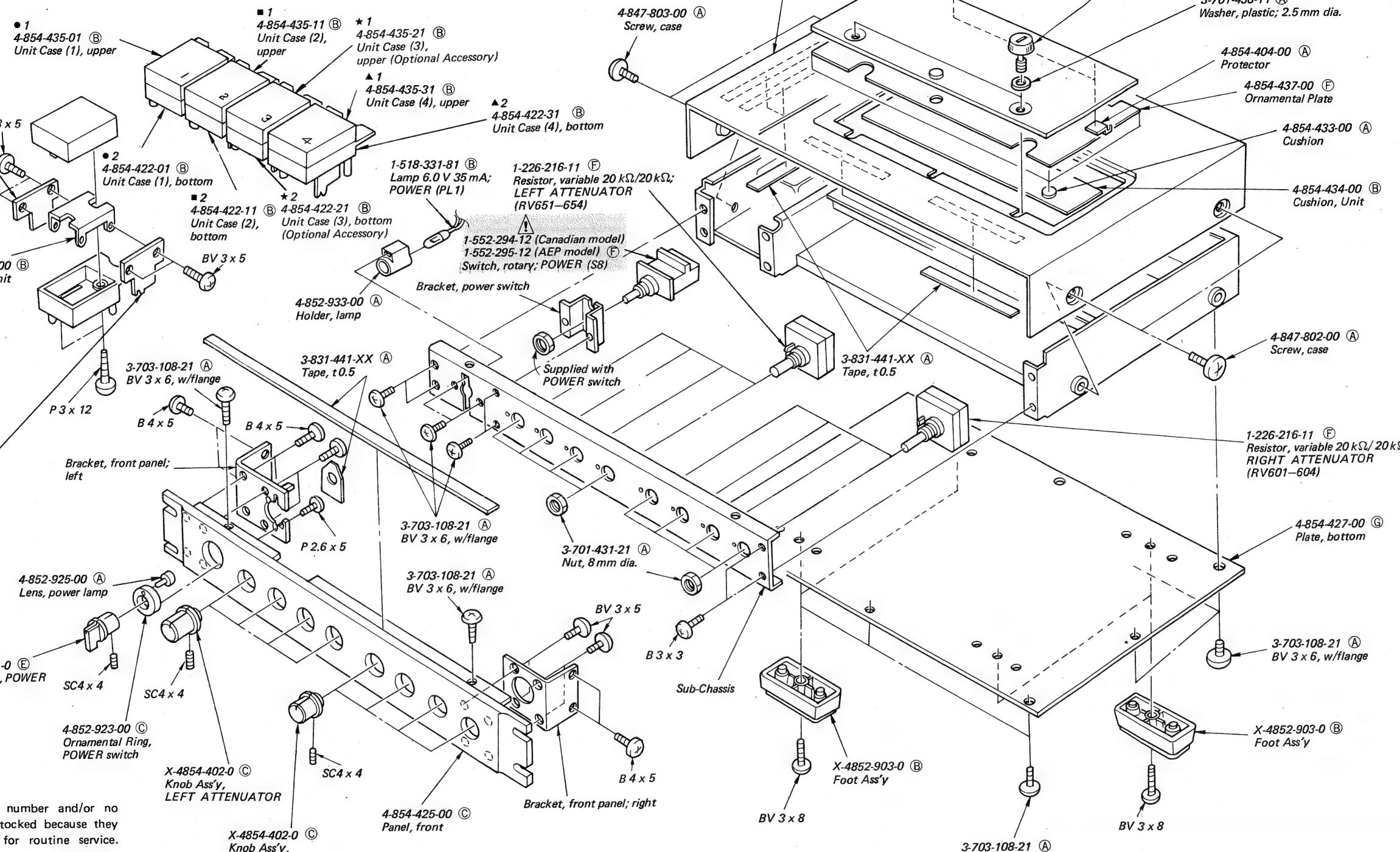
D

E

F

G

5-1.

A4464-083-A ①
Unit (1) Ass'y, including
parts marked • 1-4, ♦ 1A-4464-084-A ①
Unit (2) Ass'y, including
parts marked ■ 1-4, ♦ 1A-4464-086-A ①
Unit (3) Ass'y, including
parts marked ★ 1-4, ♦ 1
(Optional Accessory)A-4464-085-A ①
Unit (4) Ass'y, including
parts marked ▲ 1-4, ♦ 14-854-428-00 ①
Cover, topX-4854-406-0 ⑥
Cover Ass'y,
frequency response select4-854-403-00 ①
Screw3-701-438-11 ①
Washer, plastic; 2.5 mm dia.4-854-404-00 ①
Protector4-854-437-00 ①
Ornamental Plate4-854-433-00 ①
Cushion4-854-434-00 ①
Cushion, Unit

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
(—) = slotted head
- Circled letters (① to ②) are applicable to European models only.

Note: The components identified by shading and mark are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

A | B | C | D | E | F | G

5-2.

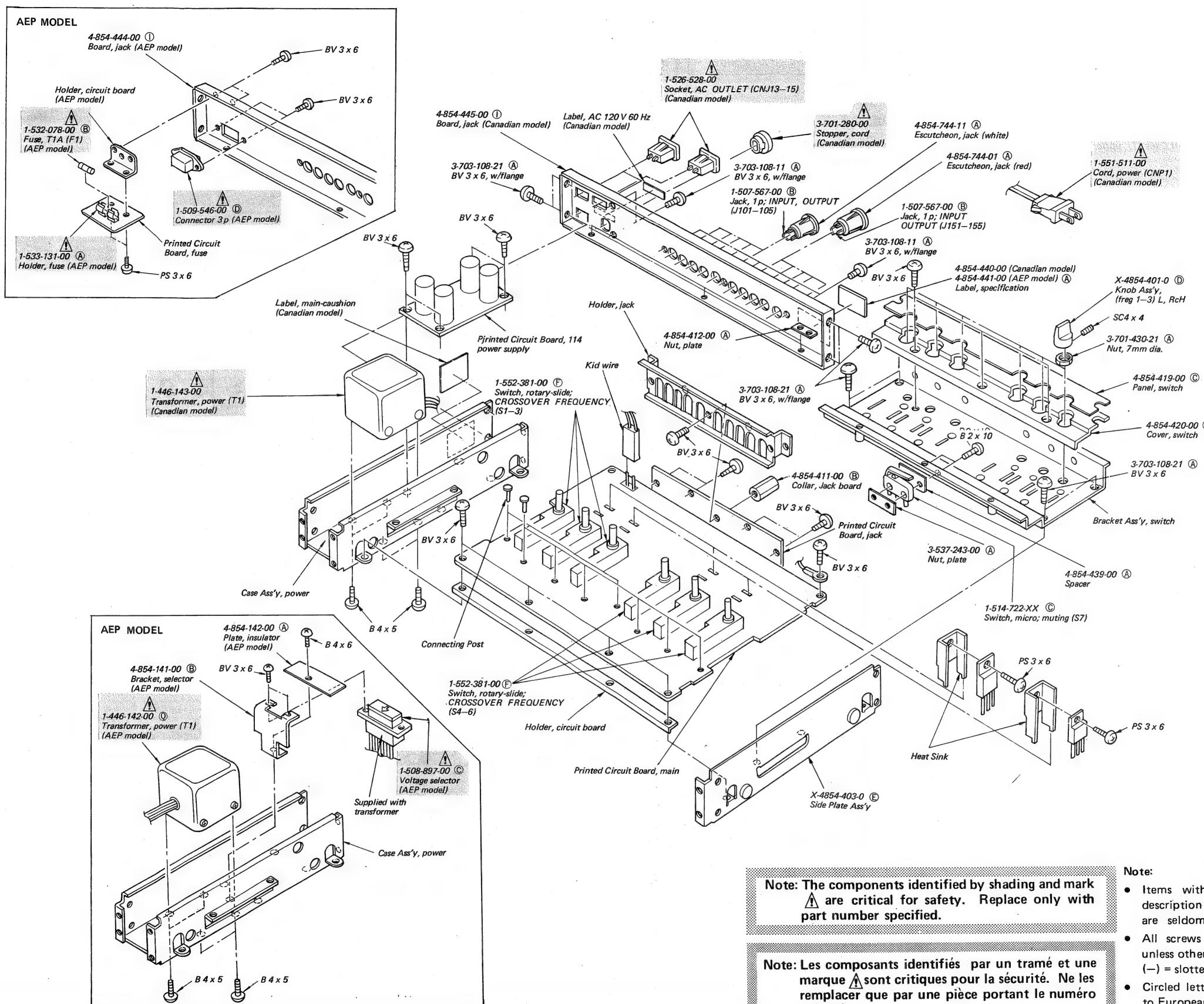
1

2

3

4

5



Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

■ **Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
(-) = slotted head
- Circled letters (**(A)** to **(Z)**) are applicable to European models only.

SECTION 6

ELECTRICAL PARTS LIST

Note: Circled letters (A to Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
PRINTED CIRCUIT BOARDS					
		1-586-853-00 (E) Unit 1A	⇒Q209, 259	8-729-163-93 (C) 2SA639S	
		1-586-854-00 (E) Unit 1B	Q210, 260	8-765-222-20 (D) 2SC1963	
		1-586-855-00 (E) Unit 2A	⇒Q301, 351	8-727-314-00 (E) 2SK42-4	
		1-586-856-00 (E) Unit 2B	⇒Q302, 352	8-720-950-03 (C) 2SC926A	
		1-586-857-00 (E) Unit 3A	⇒Q303, 353	8-729-163-93 (C) 2SA639S	
		1-586-858-00 (E) Unit 3B	⇒Q304, 354	8-727-314-00 (E) 2SK42-4	
		1-586-859-00 (E) Unit 4A	⇒Q305, 355	8-720-950-03 (C) 2SC926A	
		1-586-860-00 (E) Unit 4B	⇒Q306, 356	8-729-163-93 (C) 2SA639S	
SEMICONDUCTORS					
Transistors					
Q101, 151	8-765-342-31 (F) 2SK97		⇒Q311, 361	8-720-950-03 (C) 2SC926A	
⇒Q102, 152	8-720-950-03 (C) 2SC926A		⇒Q312, 362	8-729-163-93 (C) 2SA639S	
Q103, 153	8-765-020-00 (D) 2SA884		⇒Q401, 451	8-727-314-00 (E) 2SK42-4	
⇒Q104, 154	8-729-163-93 (C) 2SA639S		⇒Q402, 452	8-720-950-03 (C) 2SC926A	
Q105, 155	8-765-222-20 (D) 2SC1963		⇒Q403, 453	8-729-163-93 (C) 2SA639S	
Q106, 156	8-765-342-31 (F) 2SK97		⇒Q404, 454	8-727-314-00 (E) 2SK42-4	
⇒Q107, 157	8-720-950-03 (C) 2SC926A		⇒Q405, 455	8-720-950-03 (C) 2SC926A	
Q108, 158	8-765-020-00 (D) 2SA884		⇒Q406, 456	8-729-163-93 (C) 2SA639S	
⇒Q109, 159	8-729-163-93 (C) 2SA639S		⇒Q407, 457	8-727-314-00 (E) 2SK42-4	
Q110, 160	8-765-222-20 (D) 2SC1963		⇒Q408, 458	8-720-950-03 (C) 2SC926A	
⇒Q111, 161	8-727-314-00 (E) 2SK42-4		⇒Q409, 459	8-729-163-93 (C) 2SA639S	
⇒Q112, 162	8-720-950-03 (C) 2SC926A		⇒Q410, 460	8-727-314-00 (E) 2SK42-4	
⇒Q113, 163	8-729-163-93 (C) 2SA639S		⇒Q411, 461	8-720-950-03 (C) 2SC926A	
⇒Q114, 164	8-727-314-00 (E) 2SK42-4		⇒Q412, 462	8-729-163-93 (C) 2SA639S	
⇒Q115, 165	8-720-950-03 (C) 2SC926A		⇒Q501, 551	8-727-314-00 (E) 2SK42-4	
⇒Q116, 166	8-729-163-93 (C) 2SA639S		⇒Q502, 552	8-720-950-03 (C) 2SC926A	
⇒Q117, 167	8-727-314-00 (E) 2SK42-4		⇒Q503, 553	8-729-163-93 (C) 2SA639S	
⇒Q118, 168	8-720-950-03 (C) 2SC926A		⇒Q504, 554	8-727-314-00 (E) 2SK42-4	
⇒Q119, 169	8-729-163-93 (C) 2SA639S		⇒Q505, 555	8-720-950-03 (C) 2SC926A	
Q201, 251	8-765-342-31 (F) 2SK97		⇒Q506, 556	8-729-163-93 (C) 2SA639S	
⇒Q202, 252	8-720-950-03 (C) 2SC926A				
Q203, 253	8-765-020-00 (D) 2SA884				
⇒Q204, 254	8-729-163-93 (C) 2SA639S				
Q205, 255	8-765-222-20 (D) 2SC1963				
Q206, 256	8-765-342-31 (F) 2SK97				
⇒Q207, 257	8-720-950-03 (C) 2SC926A				
Q208, 258	8-765-020-00 (D) 2SA884				

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: Circled letters (Ⓐ to Ⓛ) are applicable to European models only.

Ref. No. Part No. Description

Q701, 751 8-729-217-33 ⓒ 2SC1173
 ⇒Q702, 752 8-727-312-00 ⓒ 2SK42-2
 ⇒Q703, 753 8-720-950-03 ⓒ 2SC926A
 ⇒Q704, 754 8-729-163-93 ⓒ 2SA639S
 ⇒Q705, 755 8-727-312-00 ⓒ 2SK42-2
 Q706, 756 8-729-247-33 ⓒ 2SA473
 ⇒Q707, 757 8-727-312-00 ⓒ 2SK42-2
 ⇒Q708-710 8-729-950-03 ⓒ 2SC926A
 ⇒Q758-760 8-727-788-00 ⓒ 2SA678

Diodes

⇒D701, 751 8-719-931-16 ⓒ EQB01-16
 ⇒D702, 752

D801, 851 8-719-510-10 ⓒ S1RB10
 D802 8-719-200-02 ⓒ 10E2
 D803 8-719-815-55 ⓒ 1S1555

CAPACITORS

All capacitors are in μF and polyethylene unless otherwise noted. 5WV or less are not indicated except for electrolytics.
 $\text{pF} = \mu\mu\text{F}$, elect = electrolytic

C1	⚠ 1-108-777-11 ⓒ 0.022	300 V	metalized film (AEP model)
C101, 151	1-109-170-11 ⓒ 0.001	300 V	mica
C102, 152	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C103, 153	1-130-083-11 ⓒ 1	100 V	
C104, 154	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C105, 155			
C106, 156	1-130-083-11 ⓒ 1	100 V	
C107, 157			
C108, 158	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C109, 159	1-109-170-11 ⓒ 0.001	300 V	mica
C110, 160	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C111, 161	1-121-391-11 ⓒ 1	50 V	elect
C112, 162			
C113, 163	1-121-415-11 ⓒ 100	16 V	elect

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: Les composants identifiés par un trame et une marque ⓠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No. Part No. Description

C114-117	1-121-391-11 ⓒ 1	50 V	elect
C164-167			
C201, 251	1-109-170-11 ⓒ 0.001	300 V	mica
C202, 252	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C203, 253	1-109-170-11 ⓒ 0.001	300 V	mica
C204, 254	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C301-304	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C351-354			
C305, 355	1-131-371-11 ⓒ 10	16 V	tantalum
C306, 356	1-130-127-11 ⓒ 0.015	100 V	

C401-404	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C451-454			
C405, 455	1-131-371-11 ⓒ 10	16 V	tantalum
C406, 456	1-130-127-11 ⓒ 0.015	100 V	

C501, 502	1-107-159-11 ⓒ 33 p	500 V	silvered mica
C551, 552			
C503, 553	1-131-371-11 ⓒ 10	16 V	tantalum
C504, 554	1-130-127-11 ⓒ 0.015	100 V	

C611-614	1-130-175-11 ⓒ 0.082	100 V	
C615	1-130-174-11 ⓒ 0.043	100 V	
C616	1-130-173-11 ⓒ 0.039	100 V	
C617	1-130-126-11 ⓒ 0.056	100 V	
C618	1-130-172-11 ⓒ 0.022	100 V	

C621-624	1-130-172-11 ⓒ 0.022	100 V	
C625	1-130-171-11 ⓒ 0.012	100 V	
C626	1-130-170-11 ⓒ 0.011	100 V	
C627	1-130-125-11 ⓒ 0.016	100 V	
C628	1-130-168-11 ⓒ 0.0062	100 V	

C631-634	1-130-169-11 ⓒ 0.0091	100 V	
C635	1-130-167-11 ⓒ 0.0047	100 V	
C636	1-130-123-11 ⓒ 0.0043	100 V	
C637	1-130-168-11 ⓒ 0.0062	100 V	
C638	1-130-166-11 ⓒ 0.0024	100 V	

C641-644	1-130-165-11 ⓒ 0.0022	100 V	
C645	1-130-164-11 ⓒ 0.0012	100 V	
C646	1-130-163-11 ⓒ 0.0011	100 V	
C647	1-130-131-11 ⓒ 0.0016	100 V	
C648	1-109-692-11 ⓒ 620 p	500 V	mica

Note: The components identified by shading and mark ⓠ are critical for safety. Replace only with part number specified.

Note: Circled letters (Ⓐ to Ⓛ) are applicable to European models only.

Ref. No. Part No. Description

C701, 751	1-102-246-12	Ⓐ 0.047	mylar
C702, 752			
C703, 753	1-123-192-11	Ⓐ 47	16 V elect
C704, 754			
C705, 755	1-123-068-11	Ⓑ 220	16 V elect
C706, 756			
C708, 758	1-123-196-11	Ⓐ 100	6.3 V elect
C709, 759	1-121-391-11	Ⓐ 1	50 V elect
C801, 802	1-108-421-12	Ⓑ 0.01	200 V mylar
C803, 804	1-123-246-11	Ⓓ 3300	25 V elect
C805, 806	1-108-421-12	Ⓑ 0.01	200 V mylar
C807, 808	1-123-246-11	Ⓓ 3300	25 elect
C809	1-121-398-11	Ⓐ 10	25 V elect
C810	1-121-935-11	Ⓑ 100	25 V elect

RESISTORS

All resistors are in ohms. Common $\frac{1}{4}$ W carbon resistors are omitted. Refer to the list on page 31 for their part numbers.

R101, 151	1-214-173-11	Ⓐ 51k	$\frac{1}{4}$ W	metal oxide
R127, 177				
R134, 184	1-214-180-11	Ⓐ 100k	$\frac{1}{4}$ W	metal oxide
R141, 191				
R148, 198				
R201, 251	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R202, 252	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R203, 253	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R204, 254	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R205, 255	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R206, 256	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R207, 257	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R208, 258	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R209, 259	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R210, 260	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R211, 261	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R212, 262	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R301, 351	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R302, 352	1-214-158-11	Ⓐ 12k	$\frac{1}{4}$ W	metal oxide
R303, 353	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R304, 354	1-214-158-11	Ⓐ 12k	$\frac{1}{4}$ W	metal oxide
R305, 355	1-214-160-11	Ⓐ 15k	$\frac{1}{4}$ W	metal oxide

Ref. No. Part No. Description

R306, 356	1-214-165-11	Ⓐ 24k	$\frac{1}{4}$ W	metal oxide
R307, 357	1-214-153-11	Ⓐ 7.5k	$\frac{1}{4}$ W	metal oxide
R308, 358	1-214-155-11	Ⓐ 9.1k	$\frac{1}{4}$ W	metal oxide
R309, 359	1-214-160-11	Ⓐ 15k	$\frac{1}{4}$ W	metal oxide
R310, 360	1-214-162-11	Ⓐ 18k	$\frac{1}{4}$ W	metal oxide
R311, 362	1-214-165-11	Ⓐ 24k	$\frac{1}{4}$ W	metal oxide
R312, 362	1-214-169-11	Ⓐ 36k	$\frac{1}{4}$ W	metal oxide
R313, 363	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R314, 364	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R315, 365	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R316, 366	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R317, 367	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R318, 368	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R319, 369	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R320, 370	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R321, 371	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R322, 372	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R323, 373	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R324, 374	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R401, 451	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R402, 452	1-214-158-11	Ⓐ 12k	$\frac{1}{4}$ W	metal oxide
R403, 453	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R404, 454	1-214-158-11	Ⓐ 12k	$\frac{1}{4}$ W	metal oxide
R405, 455	1-214-160-11	Ⓐ 15k	$\frac{1}{4}$ W	metal oxide
R406, 456	1-214-165-11	Ⓐ 24k	$\frac{1}{4}$ W	metal oxide
R407, 457	1-214-153-11	Ⓐ 7.5k	$\frac{1}{4}$ W	metal oxide
R408, 458	1-214-155-11	Ⓐ 9.1k	$\frac{1}{4}$ W	metal oxide
R409, 459	1-214-160-11	Ⓐ 15k	$\frac{1}{4}$ W	metal oxide
R410, 460	1-214-162-11	Ⓐ 18k	$\frac{1}{4}$ W	metal oxide
R411, 461	1-214-165-11	Ⓐ 24k	$\frac{1}{4}$ W	metal oxide
R412, 462	1-214-169-11	Ⓐ 36k	$\frac{1}{4}$ W	metal oxide
R413, 463	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R414, 464	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R415, 465	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R416, 466	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R417, 467	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide
R418, 468	1-214-163-11	Ⓐ 20k	$\frac{1}{4}$ W	metal oxide
R419, 469	1-214-156-11	Ⓐ 10k	$\frac{1}{4}$ W	metal oxide
R420, 470	1-214-159-11	Ⓐ 13k	$\frac{1}{4}$ W	metal oxide

Note: Circled letters (Ⓐ to Ⓡ) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
R421, 471	1-214-163-11	Ⓐ 20 k	1/4 W	metal oxide
R422, 472	1-214-156-11	Ⓐ 10 k	1/4 W	metal oxide
R423, 473	1-214-159-11	Ⓐ 13 k	1/4 W	metal oxide
R424, 474	1-214-163-11	Ⓐ 20 k	1/4 W	metal oxide
R501, 551	1-214-156-11	Ⓐ 10 k	1/4 W	metal oxide
R502, 552	1-214-158-11	Ⓐ 12 k	1/4 W	metal oxide
R503, 553	1-214-163-11	Ⓐ 20 k	1/4 W	metal oxide
R504, 554	1-214-158-11	Ⓐ 12 k	1/4 W	metal oxide
R505, 555	1-214-160-11	Ⓐ 15 k	1/4 W	metal oxide
R506, 556	1-214-165-11	Ⓐ 24 k	1/4 W	metal oxide
R507, 557	1-214-153-11	Ⓐ 7.5 k	1/4 W	metal oxide
R508, 558	1-214-155-11	Ⓐ 9.1 k	1/4 W	metal oxide
R509, 559	1-214-160-11	Ⓐ 15 k	1/4 W	metal oxide
R510, 560	1-214-162-11	Ⓐ 18 k	1/4 W	metal oxide
R511, 561	1-214-165-11	Ⓐ 24 k	1/4 W	metal oxide
R512, 562	1-214-169-11	Ⓐ 36 k	1/4 W	metal oxide
R707, 757	1-211-498-11	Ⓐ 10	1/4 W	carbon (nonflammable)
R708, 758				
R801	1-206-654-11	Ⓐ 390	2 W	metal oxide (nonflammable)
R810	1-244-872-11	Ⓐ 910	1/2 W	Carbon
RV601-604 RV651-654	1-226-216-11 1-226-216-11	Ⓕ 20 k/20 k, variable; LEFT, RIGHT ATTENUATOR		
RT101, 151 RT102, 152 RT201, 251 RT202, 252	1-224-247-XX	Ⓒ 100 Ω, adjustable; offset		
SWITCHES				
S1-6	1-552-381-00	Ⓕ Rotary-Slide; CROSSOVER FREQUENCY		
S7	1-514-722-XX	Ⓒ Microswitch; muting		
S8	Ⓐ 1-552-294-12	Rotary; POWER (Canadian model)		
S8	Ⓐ 1-552-295-12	Ⓒ Rotary; POWER (AEP model)		

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
MISCELLANEOUS				
CNJ1-12	1-561-141-00	Ⓒ Connector, circuit board		
CNJ13-15	Ⓐ 1-526-528-00	Socket; AC OUTLET (Canadian model)		
CNP1	Ⓐ 1-551-511-00	Cord, power (Canadian model)		
CP1	Ⓐ 1-231-341-00	Ⓓ Spark-killer (Canadian model)		
F1	Ⓐ 1-532-078-00	Ⓑ Fuse T1A (AEP model)		
J101-105	1-507-567-00	Ⓑ Jack, 1P; INPUT, OUTPUT		
J151-155				
PL1	1-518-331-81	Ⓑ Lamp, 6.0 V 35 mA; power		
RY1-8	1-515-314-00	Ⓔ Relay		
T1	Ⓐ 1-446-143-00	Transformer, power (Canadian model)		
T1	Ⓐ 1-446-142-00	⓪ Transformer, power (AEP model)		
	Ⓐ 1-508-897-00	Ⓒ Voltage Selector (AEP model)		
	Ⓐ 1-509-546-00	Ⓓ Connector, 3 p AC IN (AEP model)		
	Ⓐ 1-533-131-00	Ⓐ Holder, fuse (AEP model)		

ACCESSORY AND PACKING MATERIALS	
<u>Part No.</u>	<u>Description</u>
A-4464-086-A	⓪ Unit (3) Ass'y
1-551-315-00	Ⓗ Cord, connecting; RK-112
1-551-315-21	Ⓗ Cord, connecting; RK-113
3-701-020-00	Ⓐ Bag, check sheet
3-701-622-11	Ⓐ Bag, polyethylene
3-770-360-11	Manual, instruction (AEP model)
3-770-360-21	Manual, instruction (Canadian model)
3-794-300-31	
4-809-251-00	Ⓐ Bag, protection
4-852-949-00	Ⓒ Cushion
4-854-431-00	Ⓒ Box, accessory
4-854-432-00	Ⓒ Case, unit

Note: The components identified by shading and mark Ⓢ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque Ⓢ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

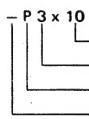
1/4 WATT CARBON RESISTORS (A)

Note: Circled letter (A) is applicable to European models only.

Ω	Part No.										
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11
1.2	1-244-603-11	12	1-244-627-11	120	1-244-651-11	1.2k	1-244-675-11	12k	1-244-699-11	120k	1-244-723-11
1.3	1-244-604-11	13	1-244-628-11	130	1-244-652-11	1.3k	1-244-676-11	13k	1-244-700-11	130k	1-244-724-11
1.5	1-244-605-11	15	1-244-629-11	150	1-244-653-11	1.5k	1-244-677-11	15k	1-244-701-11	150k	1-244-725-11
1.6	1-244-606-11	16	1-244-630-11	160	1-244-654-11	1.6k	1-244-678-11	16k	1-244-702-11	160k	1-244-726-11
1.8	1-244-607-11	18	1-244-631-11	180	1-244-655-11	1.8k	1-244-679-11	18k	1-244-703-11	180k	1-244-737-11
2.0	1-244-608-11	20	1-244-632-11	200	1-244-656-11	2.0k	1-244-680-11	20k	1-244-704-11	200k	1-244-728-11
2.2	1-244-609-11	22	1-244-633-11	220	1-244-657-11	2.2k	1-244-681-11	22k	1-244-705-11	220k	1-244-729-11
2.4	1-244-610-11	24	1-244-634-11	240	1-244-658-11	2.4k	1-244-682-11	24k	1-244-706-11	240k	1-244-730-11
2.7	1-244-611-11	27	1-244-635-11	270	1-244-659-11	2.7k	1-244-683-11	27k	1-244-707-11	270k	1-244-731-11
3.0	1-244-612-11	30	1-244-636-11	300	1-244-660-11	3.0k	1-244-684-11	30k	1-244-708-11	300k	1-244-732-11
3.3	1-244-613-11	33	1-244-637-11	330	1-244-661-11	3.3k	1-244-685-11	33k	1-244-709-11	330k	1-244-733-11
3.6	1-244-614-11	36	1-244-638-11	360	1-244-662-11	3.6k	1-244-686-11	36k	1-244-710-11	360k	1-244-734-11
3.9	1-244-615-11	39	1-244-639-11	390	1-244-663-11	3.9k	1-244-687-11	39k	1-244-711-11	390k	1-244-735-11
4.3	1-244-616-11	43	1-244-640-11	430	1-244-664-11	4.3k	1-244-688-11	43k	1-244-712-11	430k	1-244-736-11
4.7	1-244-617-11	47	1-244-641-11	470	1-244-665-11	4.7k	1-244-689-11	47k	1-244-713-11	470k	1-244-737-11
5.1	1-244-618-11	51	1-244-642-11	510	1-244-666-11	5.1k	1-244-690-11	51k	1-244-714-11	510k	1-244-738-11
5.6	1-244-619-11	56	1-244-643-11	560	1-244-667-11	5.6k	1-244-691-11	56k	1-244-715-11	560k	1-244-739-11
6.2	1-244-620-11	62	1-244-644-11	620	1-244-668-11	6.2k	1-244-692-11	62k	1-244-716-11	620k	1-244-740-11
6.8	1-244-621-11	68	1-244-645-11	680	1-244-669-11	6.8k	1-244-693-11	68k	1-244-717-11	680k	1-244-741-11
7.5	1-244-622-11	75	1-244-646-11	750	1-244-670-11	7.5k	1-244-694-11	75k	1-244-718-11	750k	1-244-742-11
8.2	1-244-623-11	82	1-244-647-11	820	1-244-671-11	8.2k	1-244-695-11	82k	1-244-719-11	820k	1-244-743-11
9.1	1-244-624-11	91	1-244-648-11	910	1-244-672-11	9.1k	1-244-696-11	91k	1-244-720-11	910k	1-244-744-11

HARDWARE NOMENCLATURE

Screw:



L: Length in mm
D: Diameter in mm
Type of head

Indicated slotted-head only.

Unless otherwise indicated, it means cross-recessed head (Phillips type).

Nut, Washer, Retaining ring:



N 3
Diameter of usable screw or shaft
Reference designation

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self-tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	